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REPORTS
AND
SPECIAL CORRESPONDENCE
OF
J. M. RUSK
SECRETARY OF AGRICULTURE

1889-1892

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ANNUAL REPORTS,
TOGETHER WITH
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RELATING TO THE
EXPORT TRADE OF THE UNITED STATES
IN
LIVE STOCK AND MEAT PRODUCTS,
OF

JEREMIAH M. RUSK,
SECRETARY OF AGRICULTURE.

1889-1892.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1893.

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1893

Compliments of

J. M. RUSK,

Secretary of Agriculture.

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FIRST REPORT

OF THE

SECRETARY OF AGRICULTURE.

1889.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.

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REPORT

OF THE

SECRETARY OF AGRICULTURE.

DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., October 26, 1889.

To the PRESIDENT :

I have the honor to respectfully submit my first annual report as Secretary of Agriculture, and the first report issued under the newly constituted Department of Agriculture.

I assumed the duties of my office March 7, 1889, or twenty-six days after the approval of the law creating an Executive Department of what had theretofore been a Bureau, in executive sense, of the Government. The Department had reached an important epoch in its history. For years there had been a demand on the part of a large majority of the farmers of the country that that Department at the seat of government which was organized to represent their interests should be clothed with the same dignity and power that other Executive Departments had, and that it should have its influence in national affairs and be recognized in the councils of the nation.

It is not necessary for me to dwell at this time upon the past growth of this institution; how there have been assigned to it from time to time additional duties and power, until now, when it comes forward as a completed wing of the executive branch of the Government, entitled to its full share of attention and protection, and needing at this time careful and intelligent effort in order that the foundation now ready to be laid shall be the commencement of a great and lasting Department, well fitted to extend its usefulness over a great agricultural domain. I deemed it my first duty, therefore, to give particular attention to such a readjustment of the current affairs of the Department as should make it better conform to its new relations under the law, and then to give careful thought to the formulation of plans for a thorough and complete reorganization of the new Department. I am not unmindful of the difficulties in the duties which have fallen to me in this regard, nor do I think that I shall overstate those to which I shall here refer.

At the very beginning I was disappointed to find that the appropriations made for the operations of the Department for the current fiscal year were those based upon the old organization of the Department, and that no provision had been made for a single anticipated want of the Department in its new field of duty. Therefore my first efforts had to be restricted to the study and formulation of plans for reorganization; to the systematizing of the records of the Department; to the consolidation, so far as possible under one head, of work of one character but being conducted in different divisions of the Department; to the formulation of a better system for the faithful accounting of public property, and in general the application of business-like principles throughout the Department. I have performed this duty while awaiting the meeting of Congress, when its attention might be called to the condition of affairs to which I have alluded, and to the urgent need of immediate attention.

Again, I found that during the growth of the Department to which I have heretofore referred, no adequate provision had been made in the mean time for additional space to meet its rapidly-increasing needs. The building it occupies was erected many years ago, and at a time when the future of the Department was problematical, and when its needs could not be anticipated. I found clerks crowded into rooms and subject to discomforts and inconveniences. I have found two branches of two distinct divisions crowded into one small room; records and books lying about upon tables and chairs for want of sufficient wall space to accommodate cases for their proper care and preservation; the chemical laboratory crowded into a damp, illy-ventilated, and wholly unsuitable basement, originally intended no doubt for storage purposes, and its work in certain investigations restricted because of the offensive fumes from such analyses, and because of the dangers to human life and limb from explosions of gases and other causes; and, in a word, there was a complete want of that systematic and orderly conduct of the public business which ought to obtain in every well-conducted office.

REORGANIZATION.

The immediate wants of the Department then, are, first, appropriations which must be made to meet the obligations of the Department to the country, which I deem urgent; and, second, a laboratory to be erected on the Department grounds, suitable for the purposes of important investigations which cannot now be undertaken. This building should be ready for occupancy at the earliest practicable day. To it I could remove certain scientific divisions and thus get much needed relief in the main building. In the mean time, I respectfully and urgently recommend that there be given me authority to rent some suitable building in this city to which divisions of the Department can be removed in order to temporarily relieve the necessity which confronts me.

Pending this necessary legislation I propose to complete plans, already formulated, for a reorganization of this Department, a portion of which has been anticipated in my estimates for the coming fiscal year. These estimates show a considerable increase over those of last year. Deducting the \$630,000 appropriated directly to the Experiment Stations of the country, there is left for the Department's needs \$1,359,000, an amount which should not be measured by the past, but rather by what a great agricultural country should pay at this time toward sustaining, protecting, and promoting a calling which lies at the foundation of its prosperity and power.

In other civilized countries, and especially in the newer countries of the world, among whom we are finding our most vigorous competitors, work analogous to that covered by this Department is prosecuted with a liberality and energy which, while it commands our respect, should not fail to serve as a warning that we ourselves must do our full duty in this matter if we expect to maintain our proud pre-eminence as the leading agricultural country of the world. Our sister republics in Central and Southern America and the Empire of Brazil have with few exceptions been devoting their best efforts, aided by liberal appropriations, to the application of science to agriculture, and this with marked success. To the north of us Canada, which has for years possessed a department of agriculture, has been working with creditable zeal on the same lines, and the same may be said of all the British colonies.

Turning our attention to the older countries of the world, we find a British department of agriculture, recently established, with an annual appropriation of a million and a half dollars at its command, while the same power combines Anglo-Saxon energy with the paternal government of the Latin races in its efforts to develop in India and in Egypt agricultural products commensurate to their teeming population and soil fertility. Germany annually expends \$2,850,000 for the same purposes. Brazil appropriated in 1885-'86 more than twenty millions of dollars for her agriculture, commerce, and public works, and Russia more than fourteen millions for agriculture and mines for the same period. France appropriated in 1886 more than eight million dollars for her agriculture alone, and Austria more than four millions during the same year.

It is my desire to organize the Department upon even a broader plane than these and other countries have established. To do so will require time and patience and that share of encouragement and support which I trust Congress will give to the Department and to the efforts of its officers.

ASSISTANT SECRETARY.

Among the features of the new law applying to this Department was a provision for an Assistant Secretary of Agriculture. Thanks to the wisdom of your choice in the selection for this position of a gentleman combining a large experience in public affairs with a thorough knowledge of scientific agriculture and trained executive ability, I have been

enabled to meet a want that has long existed in the Department, and to take one of the most important steps toward its reorganization. I have divided the Department into two grand divisions, one embracing all those divisions, branches, and sections which involve more particularly administrative and executive features, and which have been retained under my personal supervision, and the other embracing those divisions which are engaged purely in scientific investigations, which have been assigned to the office of Assistant Secretary. This plan of reorganization has been in operation for some months, and its advantage in the administration of the Department's affairs is plainly evident.

PUBLICATIONS.

One of the first conclusions forced upon me after a careful review of the valuable work of the several divisions of the Department in its application to the economy of agriculture, was the absolute necessity for prompt and effectual means of reaching the class the Department was primarily designed to serve, *i. e.*, the farmers. The very essence of the duties devolving on this Department of the Government is that its results shall be promptly made available to the public by a comprehensive scheme of publication. Time and expense, ability and experience, lavished on the work of this Department, can have no practical results unless we can lay their conclusions promptly before the people who need them.

The frequent issue of special bulletins from the various divisions relating to the work undertaken by them, instead of awaiting the issue of the annual report, already too bulky for the purpose for which I conceive it to be designed, meets with my unqualified approval, and I propose to greatly extend this practical method of intercommunication between the Department and its constituents. To reach the farmers of the country effectually, however, even more is needed than the issue of frequent bulletins in editions of 5,000 or 10,000 copies. Many of these are essentially and unavoidably scientific and the careful record of scientific investigations by scientific men, the value of whose conclusions must necessarily bear the scrutiny of scientific investigators the world over. The elimination of all scientific terms and language from such reports is impossible, while at the same time it is feasible and essential that all practical conclusions arrived at, as the result of scientific observation or investigation, must be so expressed as to be readily understood by all ordinarily intelligent people of average education.

Again, as to the number of copies required and the methods adopted for their circulation, it is clearly impossible to reach every farmer on the nearly 5,000,000 farms of the United States with all the bulletins emanating from this Department, nor is it desirable that every bulletin should reach every farmer. Farming is becoming more and more differentiated, not only into main divisions naturally created by limita-

tions as to climate and soil, but into minor divisions or specialties due to the larger experience, the higher degree of skill required in the present day to enable a farmer to prosecute his work successfully, and to which but very few men can attain in more than one or two specialties or branches of farming. Herein we find another strong argument for the diffusion of the results of our Department work in the form of special bulletins, convenient in form, promptly printed, and easily distributed.

The points to be covered in this direction may then be thus briefly summarized :

- (1) Frequent publication of the results of scientific work in the various divisions, in the form of special bulletins.
- (2) The observance, as far as practicable, of such language as will render the contents of each bulletin available to the average layman.
- (3) A method of distribution which will secure the circulation of the Department bulletins among those who will make practical use of them.
- (4) The widespread publication of the practical conclusions of the scientific observations or investigations undertaken in the various divisions, in a brief form and plain terms and on a scale so extensive as to practically reach all the farmers of this country.

To accomplish these four main objects I last July established a division in charge of a gentleman having special experience and qualifications for such work, and who will have general supervision of all the publications issued by the Department.

With a view to carrying out as far as possible the fourth proposition, upon which I lay particular stress, the plan adopted, and, as results so far show, with gratifying success, has been to prepare advance sheets of every bulletin or other publication about to be issued, such advance sheets comprising a brief synopsis of the work recorded in the bulletin and giving the conclusions arrived at which may serve as practical suggestions to the farmers. These advance sheets are furnished to the press associations, to all agricultural and many other weekly papers, to agricultural writers, and any journalists and editors applying for them. In this way, during the fifteen weeks ending October 31, no less than eighteen such synopses or résumés were distributed as above. It is a pleasure to record the fact that the agricultural papers generally and the press as a whole have shown a most commendable disposition to co-operate with the Department in its efforts to keep the farmers informed as to all that may be of practical service to them. In some cases a careful note kept of the newspapers publishing such advance sheets, apart from those covered by the press associations, indicate an aggregate circulation of over 1,000,000 copies.

A moment's consideration will show the value of a plan by which the benefits of a bulletin reaching 5,000 or 10,000 copies, and that by means of a circulation dragging along through many months, are communicated immediately to a circle of readers aggregating over three million persons, or nearly one-sixth of our entire adult farming population. Indeed this plan virtually covers the entire field, for the farmer who does not read some paper devoted to his calling is practically beyond the reach of intelligent effort on his behalf. It moreover invites application for special bulletins in advance of their publication by interested parties, an important consideration, for in the giving of valuable information "he gives twice who gives promptly."

The work of the new division in the review of the bulletins and other publications issued by the Department, is sufficiently indicated by the list of such publications forming a part of this report.

The work now engaging the attention of the several divisions of this Department is progressing satisfactorily, and I will here present for your information a résumé of what each is doing in its especial sphere. In conjunction therewith I also lay before you an outline of my plans for extending the work of these divisions, increasing their facility and enlarging their usefulness, plans which I consider essential to the successful prosecution of work which it is the duty of this Department to undertake.

DIVISION OF STATISTICS.

This branch of the Department service, relating to national resources and their development, to rural production and to distribution and consumption, is in my judgment one of the utmost importance. To aid in the collection of agricultural statistics there are over 11,000 volunteer correspondents, and a paid corps of agents in as many States as the limited appropriation allows the Department to maintain. These conduct a parallel investigation, by States, for verification and extension of the data communicated by the regular corps. What the system most lacks at present is the ability to maintain a paid statistical agent in every State. I would therefore urge the necessity of restoring, or even increasing, the original appropriation for collection of statistics, which has been reduced during the past four years, to render it possible to carry out the requirement for employing State agents for local investigations in every State, and for collection of such specific statistics as can not be obtained through the voluntary effort of our public-spirited farmers.

The office receives current official statistics from every part of the world, and files, records, co-ordinates, and elaborates such data for current publication and special use. These documents are both printed and written in all languages, in divers weights and measures, and values represented by the coins of the world. Their receipt is necessarily irregular, coming from near and distant parts of the globe, freighted

with news of crops ripening in every month of the year. There is great difference in the promptness of their preparation and in the degree of their accuracy, while many minor countries possess no statistical systems. These facts suggest the extent of the work and the difficulty of its efficient performance.

The work consists of the preparation of reports, investigation of industrial problems, collation of comparative international statements, responses to inquiries from foreign legations, from members of Congress, from rural and commercial bodies, and from editors and other publicists seeking information for immediate publication.

During the past year the official published reports have included the monthly series prepared by the Statistician, the annual report of statistics in the volume of Department reports published by Congress, and an album of agricultural statistics. The latter is the initial publication of a series of graphic illustrations of agricultural statistics which has been demanded by educators and agricultural writers for years, as a means of popularizing such statistics.

The material furnished to officials of this and other countries, industrial and commercial organizations, editors, and writers, in manuscript form, has been scarcely less voluminous than the publications.

The crop-reporting system, which has been copied in many foreign countries, and, in its main features, by our State statistical bureaus, while approximate and valuable, is in danger of becoming discredited by the popular acceptance of its results as exact in precision and absolute in authority. It should be remembered that they are not the conclusions of a thorough census, though they may be far better than the work of a poor census; that they are the consolidations of local estimates of agricultural experts, and are intended as a foil to the interested, biased, and untruthful statements that speculators issue to mislead their victims. It is recognized that producers, consumers, forwarders, and dealers in actual grain have a common interest in learning the exact truth of production.

The monthly crop reports of the Statistician are now limited to statistical correspondents and writers for the press, the brief telegraphic summary sent out on the 10th of each month being so sent out through the press associations. My present purpose is, that hereafter, at least during the crop season, a more extended summary of each forthcoming report shall be prepared, in advance of its regular circulation, of which a large edition may be printed for transmission to agricultural and other weekly papers, to postmasters, farmers, and any others who desire to receive it.

THIS YEAR'S CROPS.

The statistical records of the season indicate an average yield of cereals, a full supply of meats of all kinds, and a cotton crop adequate

for all demands. Potatoes have received some injury from rot, which has been more prevalent in the East than in the West. Fruits have been produced in only moderate abundance, apples especially yielding sparsely in the more favorable locations, and producing scarcely a third of a full crop. The increase in variety of fruits and in area occupied, in California and Florida, is yearly enlarging our resources and in some directions limiting importation of subtropical kinds.

The great crop of American arable culture, corn, is larger in breadth this year than ever before, comprising more than half the area of all cereals, and representing three-fourths of all the maize grown in the world. It promises slightly more than an average yield, which has been about 26 bushels per acre. Though slow in germination and early growth, in the Eastern and Southern States, from excess of moisture and low temperature, the season was long and frosts late, with freedom from droughts except in local and very limited areas.

The production of wheat has for several years been so large as to reduce the price to a point so low as to discourage growers. There has been an increase of demand, since 1880, due to increase of population, of 70,000,000 bushels, and a decline in foreign demand of about 65,000,000 bushels. The exportation of 1880-'81 was 186,321,514 bushels, in wheat and flour; the average for eight years since has been 121,300,638 bushels. This country still supplies the larger part of the European deficiency, which is much smaller than in the period of poor European harvests about ten years ago. The present crop will be a full average (between 12 and 13 measured bushels per acre), but the quality is below an average, with lower weight and bread-making capacity. There is an ample supply, however, for all probable European demands, though deficient yields elsewhere should tend to sustain if not to advance prices.

The product of cotton approximated closely 7,000,000 bales for the first time in 1884. The crops of 1887 and 1888 each attained about the same volume, and that of 1889 has a slightly increased area, while the October percentage of condition was somewhat higher than last year, giving promise of another large crop. Yet it is acknowledged to be late, subject to unusual injury from possible early frosts, and therefore as yet uncertain in its rate of production. It is gratifying to observe that this product still meets with ample demand and maintains its value in the markets of the world, the production of the United States as well as the world's consumption having nearly doubled within thirty years. There is no immediate prospect of the loss of this supremacy in cotton growing.

The necessity of economy in meat production has stimulated greatly the production of hay and dried forage, and the extension of the silo system, which has been encouraged by the demand for succulent feed, in the absence or scarcity of roots, has greatly enlarged the variety and volume of feeding material. In the arid regions alfalfa has absorbed a

considerable area of irrigated lands, and is assuming large proportions in the crop distribution of those areas. The increase of forage and hay is relatively greater in the South than in any other portion of the country.

THE ROCKY MOUNTAIN REGION.

The development of agriculture in the Rocky Mountain districts has been very rapid of late, and is full of promise for the immediate future. Millions of acres are already under irrigation, with results more certain and satisfactory than in States solely dependent on current rainfall. New enterprises are in progress, and Government surveys for highland reservoirs have been initiated. Already the value of the products of agriculture on the Pacific coast, if not in Colorado, in the heart of the mountain system, is greater than that of the products of mining. The Division of Statistics, under my direction, is investigating these resources and measuring their development, with all the facilities at its command. The results will surprise the Eastern States with new views of the wealth and progress of the Great American Desert of the recent past.

The work of this division is presenting to the world the marvelous results of our agriculture, which supplies our rapidly-increasing population with rations greatly* in excess, in quantity and variety, of any other nation on the globe, and appropriates a larger surplus, both in volume and proportion, to supply the deficiencies of foreign markets than any other country is able to spare.

It is gratifying to note the appreciation of the work of the Division of Statistics by statesmen, publicists, and statisticians of this country, and to acknowledge similar high commendations from prominent foreign editors, and from executive statistical officers of foreign Governments, some of whom have recently declared the body of agricultural statistics of the Department of Agriculture of the United States the best in the world.

It is proposed, in response to repeated inquiries, to give special attention to local statistics, to concise yet comprehensive agricultural surveys of States and Territories, which will give a fair and full showing of natural resources and their development, without coloring from local pride or pecuniary interest, and yet appreciative of natural advantages only partially improved. It is desirable that local capabilities should be accurately presented, and worthy of the confidence of those who discredit the extravagances of immigration solicitors and land speculators. The plain truth is quite as much as the eastern inquirer can be induced to accept. It is regretted that available means will only suffice for a beginning of this work, which should be presented hereafter more rapidly and promptly as statistical appropriations shall warrant.

It is my intention next year to make an effort, through the medium of our numerous county statistical correspondents, to bring the De-

partment into closer touch with the farming community at the county fairs held throughout the country. At a trifling expense these county statistical agents should be enabled to attend their several county fairs, armed with a commission to report to this Department as to the character and extent of their exhibits, both of field products and live stock, the amount of premiums conferred, manner of judging, etc. At the same time these agents would be authorized to secure for this Department, as far as practicable, samples of the finest exhibits of field products, thus furnishing the most tangible evidences as to the character of the products and the agricultural possibilities of all sections of the country. An immense amount of time and money is expended in the aggregate upon these county fairs. To what extent they may be made subservient to the duties of this Department is necessarily a matter of speculation, but I am convinced of the propriety of endeavoring to utilize these gatherings in some such way as I have indicated. Everything that leads to a more intimate acquaintance between the Department and the farmers throughout the country must be mutually advantageous.

DIVISION OF ENTOMOLOGY.

The results of the labors of this Division have been of great importance, and in no direction more than in the outcome of the effort to import the parasites and natural enemies of the Fluted Scale insect of California. The entomologist, after careful investigation, satisfied himself that this insect, which of late years has so seriously affected orange culture in southern California, was a native of Australia and was comparatively harmless there, owing to the natural enemies which kept it in check and which had not been imported into this country with it. Efforts, through correspondence, to import one of the parasites that had been studied proved but partially successful, and the Department was anxious to take advantage of the Melbourne Exposition to have agents visit Australia with the express object of helping to import these enemies of the Scale alive. Accordingly, an arrangement was made with the Department of State whereby two of the salaried agents of the Entomological Division were to be sent to Australia, the one with instructions to report on and send over the enemies of the Scale insect, the other to report to Mr. McCoppin, commissioner to the Melbourne Exposition, on the agricultural features of the exposition, the State Department defraying their expenses.

The results of this undertaking have more than justified the most sanguine anticipations. Several of the parasites have been introduced and acclimated, while one of the predaceous insects thus imported, viz., a lady-bird (*Vedolia cardinalis* Mulsant), has increased so enormously and is so active an enemy of the scale that several important orchards have already been completely freed from the pest by its agency, and despondency has given way to hope and confidence among California

orange-growers. This result furnishes a most striking illustration of wide-spread benefit resulting from scientific investigation and effort.

The year has been remarkable for the great prevalence of blights, both of a fungus and insect nature. The most serious insect outbreak of the year was the appearance in enormous numbers in the wheat-fields of Ohio, Indiana, Wisconsin, Michigan, and Illinois of the grain aphid. This insect remained in the fields in injurious numbers much later than in ordinary seasons, and the result has been considerable shrinkage of the crop in the infested States. This pest has been carefully studied and data have been collected for full report.

For the past few years there has been much complaint from the orange-growers of Florida of a new pest in the shape of a leaf-mite which causes an injurious shedding of the foliage in the winter, and which has made its appearance since the completion of the special investigation of the insect enemies of the orange. This mite has been the subject of special investigation during the year.

Much time has already been given to the thorough investigation of the horn fly, a pest to horned cattle newly imported from Europe. This insect was first noticed in this country rather more than two years ago in the vicinity of Philadelphia, and has since greatly increased and spread to the southward along the Atlantic States until it has now reached southern Virginia. It is a serious drawback to the stock and dairy interests of the localities which it has reached, very greatly reducing the condition of cattle and the yield of milk. The complete life history has been followed out and field experiments have been made which result in establishing satisfactory remedies and preventives.

The publication of the report of the investigations of the injury to the roots of peach and other crops in Florida by swellings caused by eel-worms has been unavoidably delayed on account of matters connected with the illustrations, but it has now been published as Bulletin 20 of this Division, and will doubtless prove of value not only to horticulturists and fruit-growers in the South, but to gardeners in other parts of the country, as allied worms are found throughout our entire territory.

The publications of the Division have also occupied a considerable portion of the time of the office force. The periodical bulletin, *Insect Life*, has been issued regularly every month, and its usefulness and popularity are shown by the great demand for it. The wisdom, which has never been questioned, of establishing this means of communication with the farmers and working entomologists has become more and more apparent, and the editing and oversight of its monthly numbers has come to be one of the most important of the Entomologist's duties.

The Bibliography of Economic Entomology which was ordered by Congress in July, 1882, is now nearly completed. The extent of the work made it advisable to publish it in several parts, and Parts I, II, and III are now rapidly going through the press.

SILK CULTURE.

The interest in silk culture still remains unabated. The correspondence in no other Division is more widespread or in larger proportions, showing a conviction in the public mind that success is possible. There seems to be no question that the mulberry tree can be grown and the cocoon produced economically in a large area of this country. The fact that this culture, up to the production of the cocoon, can be made largely a household affair, and needs no large expenditure of money, and that the sums, small though they be, realized from the sales of cocoons, would be a blessing to innumerable families, an income added to, without in any way interfering with, the regular occupation which provides daily support, leads me to desire to continue the work as laid down by Congress. The real question, however, is the market for the cocoons, which need to be reeled before the silk is fit for the spinner. In competition with the hand-reeling of other countries the industry here would fail, as the difference between the cost of reeling here and the cost there would manifestly be deducted from the price paid for the cocoons, and would so reduce their market price as to discourage the industry of raising them.

The prime effort of the Department in this work is properly in trying to perfect an automatic reel that shall substitute machinery for manual labor in reeling. While success in this direction is not yet secured, the prospects are sufficiently favorable to make me hopeful of ultimate good results. Mr. Philip Walker was dispatched to Paris a few months ago with instructions to study fully and carefully the whole subject of silk-culture, especially in its relation to our own efforts, and with a view of ascertaining what progress and improvements are being made abroad. He has not yet returned, and beyond the usual annual appropriation for the continuance of the work I must refrain from making specific recommendations until I have before me the results of his investigations.

CHEMICAL DIVISION.

The work of the Chemical Division has been vigorously carried on under disadvantages and discomforts to which I have heretofore alluded. In accordance with a law enacted at the last session of Congress, providing for an extension and continuation of the investigation of the adulteration of foods, drugs, liquors, etc., the division has completed two parts of Bulletin No. 13, consisting of Part 4, which treats of lard and its adulteration, and Part 5, which treats of baking powders, their manufacture, use, and chemical composition. In accordance with the requirements of the act alluded to, I shall, in due time, make a separate report to Congress of the operations of this division under the said appropriation. In addition to these investigations very complete analyses have been made of sorghum seed to establish their value as

a cattle-food, and investigations have also been made upon the seeds of *calacanthus* growing wild in the mountains of North Carolina, and which prove very poisonous to cattle eating them. From these seeds a new alkaloid has been separated and its properties described.

Important investigations have also been carried on in the Chemical Division to determine the influence of different kinds of food upon the composition of butter. These results have proved of the greatest interest, and have shown that the quality and composition of the butter are greatly influenced by the character of the food used.

SORGHUM AND BEET SUGAR.

The Chemical Division has also conducted during the past year additional experiments looking to the manufacture of sugar from sorghum and sugar beets. Chemical laboratories have been established in connection with sorghum sugar factories at Rio Grande, N. J., Morrisville, Va., Kenner, La., Cedar Falls, Iowa; and at the following points in Kansas, namely: Sterling, Ness City, Conway Springs, Attica, Medicine Lodge, Minneola, Mead, Arkalon, and Liberal. The results of the season's work are not yet fully collated, but a general idea of them may be expressed. In New Jersey and Virginia the late, wet spring and the remarkably wet summer prevented the maturity of the cane, and thus prevented the successful manufacture of sugar. The results obtained in Louisiana were of a mixed character. In some cases considerable quantities of sugar were made per ton of cane; in one instance over a hundred pounds; while in other instances the results were of a most disappointing character. The results of the experimental work at Cedar Falls, Iowa, were also of a discouraging nature. No sugar of any consequence was made; and it may be stated that while as far north as Cedar Falls molasses may be made with profit, it is probably too far north to permit of the successful manufacture of sugar from sorghum.

The results of the experiments in Kansas have shown that in the extreme western portion of the State the season proved too dry for the production of a crop of sorghum cane suitable for sugar-making. On the other hand, in the southern portion of the State, west and south of Wichita, fine crops of sorghum cane were produced, and sugar made in such quantities as to foreshadow the financial success of the industry in those localities and in places further south. The general result of the recent experiments in the manufacture of sugar from sorghum carried on by the Department has determined the localization of this industry, in so far as financial success is concerned, in the region indicated above. If success attend the sorghum-sugar industry in the future, there seems to be reasonable ground for believing that in the southern part of Central Kansas and in many parts of the Indian Territory, where the soil and climate are similar to that part of Kansas mentioned, it may especially

flourish. There are, perhaps, also other parts of the United States where similar success could be secured, but these have not yet been pointed out.

Important progress has also been made during the past year in the development of varieties of sorghum containing a higher content of available sugar than those heretofore grown. These experiments have been carried on at Sterling, Kans., and at College Station, Md. Similar experiments have also been conducted in connection with the manufacturing work at the places mentioned above. A large number of analyses have been made during the last year and the present season for the purpose of selecting for planting the seed of those varieties and individuals whose juices show the highest percentage of available sugar. The results have gone far enough to justify the belief that by a selection of this kind a permanent improvement can be secured. It is certain that should the sorghum-sugar industry prove successful the growth of the seed will be a separate business, controlled by experts and carried on under those conditions most favorable to the production of the highest content of sugar. What can be accomplished in this line has already been illustrated with the sugar-beet, and there is every reason to believe that equally favorable results can be secured with sorghum.

In regard to the beet-sugar industry, experiments have been made in various parts of the United States in the growth of beets and in the analyses thereof. Many of these analyses have been made in the chemical division of the Department at Washington, and show that there are many localities, especially in the northern portion of the United States and on the Pacific coast, suitable to the production of a sugar beet rich in saccharine matter. The successful experiments in beet-sugar manufacture in California have created a great deal of interest in various parts of the United States in this industry, and the Department has received many inquiries for information on this point. The chemical division is now collecting material for a full report on the beet-sugar industry in the United States, which it is hoped may be published early the coming winter.

BOTANICAL DIVISION.

Besides the general scientific work, which has been extensive, the special effort of the Division has been directed to grasses and forage plants, and more particularly to those adapted to the Southern States and the arid and semi-arid regions of the West. A grass station has been conducted in connection with the Mississippi Agricultural Experiment Station for that region of the South, and one is being established in co-operation with the Colorado Experiment Station, which, with the independent grass station established last year at Garden City, Kans., which has been enlarged and more fully equipped, inaugurates the line of experiments contemplated for the arid region. The results of the year's work in both regions have been eminently satisfactory.

What the Southern States need at the present time, agriculturally, more than anything else, is a productive grass. The desire is to place stations at two places other than that in Mississippi.

The problem the Department is seeking to solve in the arid region is an increase of forage on the non-irrigable lands. There is far less need of experiments on the irrigable lands. What they are capable of producing is almost beyond computation, but the question whether the 300,000,000 of acres and more outside of possible irrigation can be quadrupled in forage possibilities, is of immense import. It is believed that as nature has selected the grasses growing there a cultivation of the same must promote their productiveness in that locality, as it does other grasses elsewhere. Accordingly wild-grass seeds are being collected and are to be propagated in the station there. The Department desires to establish, independently or in connection with the experiment stations, four more stations in the West, so as to cover all Western conditions.

The division has issued during the year Bulletin No. 8, entitled "A record of some of the work of the division, etc.," and has now in press a new revised edition of the "Agricultural grasses of the United States," a very comprehensive and practical treatise on this important product. It has distributed to seven of the Agricultural Experiment Stations each a herbarium of carefully mounted botanical specimens of grasses and species of our native grasses as types, material very much needed at those new stations for the successful development of their work. It has had agents in various regions not yet fully explored, botanically, to collect specimens for our national herbarium, which will enable us to assist further the agricultural colleges, and also to make exchanges with and contributions to various foreign scientific societies. I consider the work of this division as judiciously planned, and if continued on the lines which I propose it will place our botanical collection at the head, as it should be, of similar collections in the country, if not in the world.

During the past summer the chief of the division visited, by my direction, Kansas, Colorado, New Mexico, northwestern Texas, Arizona, California, and Utah, and spent two months in the investigation of the native grasses and of the climatic conditions of the arid districts, so as the better to be able to grapple with the forage problem of those States and Territories.

THE SECTION OF VEGETABLE PATHOLOGY.

The work in this section is very important. It covers the diseases of plants, their nature and treatment. During the last growing season agents were located in New Jersey, Delaware, Virginia, South Carolina, Mississippi, Missouri, Michigan, Wisconsin, and California to investigate the plant diseases peculiar to those localities—notably black-rot, downy mildew, and anthracnose of the grape, root-rot and rust of cotton, and pear and apple diseases. Special attention has been given to

the *blight* of the Le Conte pear in Southern Georgia, and to *peach yellows* in Maryland, Delaware, and other States. While successful treatment has not been reached in the former case, and the cause of the latter is still unknown, very substantial progress has been made in both, and in the latter there is promise of highly beneficial developments. It is too soon to predict as to the pear-blight, but the hope is awakened that a remedy can be found.

Within the last two or three years a most destructive disease of the grape-vine appeared in southern California, which promises, if not checked, to destroy utterly the production of grapes in that locality. An agent of the section was dispatched there last June who has instructions to remain on the ground indefinitely to study the nature of the disease, and, if possible, discover a remedy.

In all these cases the work has consisted largely of field examinations supplemented with microscopic work. The latter has given evidence that all the diseases, with the exception of the California vine trouble and the peach-yellows, are due to plant parasites, and from the evidence now at hand it is very probable that even the last two are caused by bacteria which attack the healthy plants as well as those lacking in maturity or vitality. Experiments are being conducted both in the field and in the laboratory to determine, however, the true nature of these diseases. The immense losses caused by them justify the amplest expenditures in seeking their natures and devising a remedy.

DIVISION OF ECONOMIC ORNITHOLOGY AND MAMMALOLOGY.

Two distinct lines of research are carried on by this division—one devoted to the study of certain species or groups of species which are harmful or beneficial from a directly economic stand-point, and particularly from the farmer's point of view; the other—equally or even more important—a study of the fundamental facts, principles, and laws which underlie the present geographical distribution of life.

The primary object of mapping the geographical distribution of species is to ascertain the number, position and boundaries of the faunal and floral areas of the United States, areas which are fitted by nature for the life of certain associations of animals and plants, and which, consequently, are adapted for the growth of certain vegetable products and for the support of certain kinds or breeds of stock. The results of this study of the natural *life areas* of the country are of the utmost value to practical and experimental agriculture, and are so intimately related to the work of the experiment stations that the investigations of the latter can not be fully utilized without a knowledge of the more important facts which the study of geographical distribution affords. The work of mapping the distribution of species has received as much attention as the limited funds at command would permit. The most important work in this line has been a systematic biological

exploration an area of about 5,000 square miles in extent in Arizona. This exploration was conducted by Dr. Merriam, Chief of the Division, assisted by Mr. Vernon Bailey, field agent, and resulted in the discovery of many species new to science, and in the acquisition of many facts of economic consequence. It was demonstrated that complete accord exists between the distribution of animals and plants, governed by physiographical conditions. The boundaries of the areas inhabited by certain associations of species of birds, mammals, and reptiles, were found to coincide with one another and with the boundaries of the areas inhabited by certain species of plants. The knowledge of this fact emphasizes the importance of the study of the flora of a region in connection with the study of its fauna.

In the first line of work may be noted the compilation and publication of the bulletin on the English sparrow, a volume of 405 octavo pages, the demand for which was so great that thousands of applications for it were received in advance of its publication. Although so short a time has elapsed since its appearance, some of its good effects are visible already in the successful efforts for the restriction and extermination of the sparrow. The study of the food of crows continues, and a bulletin will be ready for distribution before the close of another year. A full and copiously illustrated bulletin on hawks and owls is nearly ready for the printer. The collection of stomachs of birds believed to affect agricultural interests now number 10,675. More than 3,000 specimens of birds were received for identification between January 1 and October 1, 1889.

DIVISION OF MICROSCOPY.

The work of this Division is largely in the line of original microscopical investigation of food stuffs, including the condiments of commerce, and in preparing microphotographic illustrations of pure food products and of the adulterants used in them. The teas of commerce have been the subject of like investigation. It is found, it is claimed, that the leaf of the tea-plant has marked characteristics not found in any of the plant leaves used for adulterants. An extended investigation has been made relating to the color reactions of the pure native olive oil from California, and of its adulterants, such as cotton-seed oil, oil of sesame, oil of poppy seed, and peanut oil. It is claimed that there are very marked color differences.

THE TEXTILE FIBERS.

I have given much thought, since assuming my duties, to the subject of fibers, a subject whose importance can not be overestimated, and I have found a wide-spread interest in the matter of a promotion of the cultivation and manufacture of flax, jute, and ramie, and other textile fibers. The correspondence of the Department on this subject has be-

come very large. In the States of Indiana, Illinois, and all the Northwest, large amounts of flax are raised for the seed alone. The question now is, can not the fiber be utilized also? While the cultivation of jute and ramie can hardly be classed, as yet, beyond the experimental stage, enough has been grown to justify the belief that in most of the Southern States they can be produced in abundance and of good quality.

The question, therefore, is not so much whether this country can produce all these fibers as whether the farmer can find a market for those he may produce. The manual labor heretofore necessary in the separation of the fiber from the stalk has, in competition with the cheaper labor of other countries, rendered it impossible for the fiber industry here to maintain an economic standing, and our only hope lies in the invention of decorticating machines that shall take the dry stalk or the green one as the case may be, and produce in one, or at most two operations, the fiber in a short time with a minimum of cost and without the primitive manual labor incident to the rotting, breaking, hatcheling, pounding, etc.

Within the last five years the mechanical genius of both continents has been directed to the invention of machinery to accomplish these results. It is claimed emphatically that there are one or more such for the rendering of flax. Several machines and processes for the rendering of the ramie fiber, which is far more difficult than that of flax, are claiming public consideration, but the tests of their efficiency at this date, as reported to this Department, have not fully demonstrated their economic success. Still, there has been such substantial progress made in the last five years that we seem to be approaching the solution of the problem.

Seeing the importance of this subject, I have taken advantage of the presence at the Paris Exposition of a gentleman versed in this subject, and have commissioned him to investigate all the fiber machines on exhibition there, to visit all the flax and hemp growing countries of Europe, to examine the flax machines in operation and the ramie machines wherever tested, and to report thereon fully. I am seeking for information from every quarter likely to give it, and to do all that can be done to promote an industry that will, if successful, save to this country \$20,000,000 annually, and which may take the place of raising of wheat and other cereals in States where their production is not now profitable. I shall ask from Congress an appropriation to enable me to prosecute a more extended investigation of this subject.

AGRICULTURAL EXPERIMENT STATIONS AND OFFICE OF EXPERIMENT STATIONS.

As a central agency for the agricultural experiment stations of the country established by act of Congress it is the duty of the Department, through the Office of Experiment Stations, to indicate lines of inquiry for the stations, to promote the co-ordination of their work, to

furnish them needed advice and assistance, and to collate and publish the results of their experiments. To this end it conducts a large and increasing correspondence relating to the scientific, administrative, and general interests of the individual stations and the enterprise as a whole. Its representatives visit stations, agricultural colleges, and kindred institutions. It collects statistics and other information regarding agricultural science; compiles results of inquiry, past and present, in this country and in Europe, which are greatly needed and earnestly called for by the station workers and others interested in agricultural science; and puts the results of station work in practical form for general distribution in farmers' bulletins.

For the ensuing year this office needs means proportionate to the pressing demand for the enlargement of its work in all the lines named, including especially the collating of fruits of experience and making them available to the stations and the agriculture of the country and the promotion of inquiries of general importance in connection with the stations in different sections of the land. With other lines of inquiry, the study of the far-reaching problems relating to the food and nutrition of domestic animals and of man, and the systematic investigation of our soils, already begun in accordance with special provision by act of Congress, should be undertaken on a broad and scientific basis.

The development of the experiment-station enterprise in this country is a noteworthy illustration of the readiness of the American people to grasp and to utilize new and valuable ideas. Beginning only fourteen years ago, it has grown out to the farthest limits of the land, enlisted the best colleges and universities and the ablest investigators, and secured both State and national resources for its maintenance. It now employs nearly four hundred workers "to promote agriculture by scientific investigation and experiment," and to diffuse as well as increase the knowledge which improves farm practice and elevates farm life. It has the favor of a great army of practical farmers, to whom it has already brought substantial benefits. The experience thus far gained evinces the wisdom of Congress in distributing the work throughout the country where it may be adapted to the wants of the various sections, and placing it in connection with institutions of learning which are, in general, laboring faithfully to fulfill the trust imposed upon them.

Crudity and mistakes are here and there apparent. But the general effort of the stations toward the greatest usefulness, the wise action of the Association of American Agricultural Colleges and Experiment Stations, the cordial support of the people, State legislatures and Congress, and the practical results already obtained, imply that the national Government has made no mistake in undertaking this enterprise on a larger scale than has been attempted elsewhere in the world. At the same time we should remember that quality more than magnitude

decides the value of every enterprise, and that this one can attain its highest success only in proportion as the laws which underlie the practice of agriculture are discovered and made available to the practical toilers of the farm.

FORESTRY DIVISION.

Only very slowly are our people beginning to realize that our natural forest resources, subjected to wasteful methods and unprotected against the ravages of fire and other destructive agencies, are liable to deterioration if not exhaustion, although capable by the application of proper management of yielding continual crops of valuable material. Blind to the experience of other nations, we must learn by experience at home that the condition of our water-sheds and river systems is, to a large extent, influenced by the condition of our forest areas.

Forest management under existing circumstances does not attract private activity, and it would seem to be the duty of the Government to assume a more definite supervision of such forest areas as are still owned by it, and as occupy a position of importance in the regulation of water-flow and of other climatic conditions.

The relations which these forests bear to the water conditions and river systems of the Rocky Mountain region and to the problems of irrigation in the arid lands is a matter for grave consideration.

A further practical work would consist in experimenting as to the possibilities of reforesting the now treeless regions of our country.

This Division was designed to serve as a bureau of information in regard to the forestry interests of the country. Its work in the beginning was naturally tentative, and the information could only be of a general character, having in view primarily the creation of a more general interest in the subject. With the growth of interest in forestry and a better understanding of its usefulness and desirability, the information asked has become more specific, and to supply this better facilities are needed. We must be able to supply information as to the present extent, location, and condition of forest areas, their present yield and future promise, the progress of deforestation by various agencies, the progress of reforestation by private enterprise, and the bearing which these processes have upon lumber supply as well as upon the country at large. We are at present without definite knowledge of the extent, location, condition, and direct or indirect value of the forest property which has remained in the hands of the General Government much less of the forest conditions of the country.

Statistical information of this kind can be had only by means of a thoroughly organized canvass, with ample appropriations. The division has heretofore had to confine its work mainly to supplying such information as could be gained by scientific studies, by observation, by consulting the literature, foreign and domestic, on the subject with the view of advancing our knowledge of forest management and forest

planting, of the life history of our trees and of the properties of their timber.

The biological studies and the investigations into the technical properties of our timbers have been continued, and the publication of some of the monographs relating to the life history of our most important conifers is contemplated within the year.

The relation of various industries to forest supplies has been made the subject of inquiry, especially that of the cooperage industry, and the carriage and wagon manufacture.

The important question of substituting metal for wooden ties, treated of in Bulletin No. 1 of this division, has received additional consideration in Bulletin No. 3, published this year as a preliminary report of an inquiry into the practicability of such substitution and the extent to which it has taken place in this and foreign countries.

A full report on this subject, with additional information regarding the progress of the methods and application of wood-preserving processes, is in preparation.

The provision of the law which calls for the distribution of plant material could be satisfied only in a very limited way, in proportion to the limited appropriations.

The collection of information naturally leads to the collection of material from which information may be derived. Attention has, therefore, been given to the establishment of a collection of forest botanical specimens, the absence of which has been a long-felt drawback to the work of the Division. In addition, a tolerably complete collection of forest-tree seeds has been gradually brought together which permits the control as to kind of seeds purchased, and prevents the danger of substitution.

The library of reference books in forest literature of this and other countries, although by no means complete, has also been enlarged, so as to make the facilities of the Division for the student of forestry, in that respect at least, what they should be, the best in the country.

The magnitude of our forestry interest is best represented by the statement, based upon the best authorities available, that our present annual forest production amounts to \$700,000,000, a figure which it seems likely could, by judicious management of our present forest area, be maintained if not exceeded without impairment of the capital from which it is derived.

DIVISION OF GARDENS AND GROUNDS, HORTICULTURE, ETC.

The duties of this Division consist, partly, in keeping in proper condition the roadways, walks, trees, and crops on the forty acres of reservation known as the Grounds of the Agricultural Department; the management and care of the plants in the conservatories, propagating houses, and other glass structures; the introduction, propagation, and culture of economic or useful plants, and the distribution of such plants

in localities where climatic and other conditions seem favorable to their growth.

The main feature of interest in the ornamental portion of the grounds is the method employed in grouping trees and shrubs. These are arranged in strict accordance with a botanical classification, at the same time securing landscape-gardening effect.

The portion originally set apart for out-door propagation and for gardening purposes has been much abridged by the erection of buildings to accommodate the increasing operations of the Department; consequently the testing of new varieties of fruits, formerly a prominent feature in the work of this Division, has been virtually abandoned. The exposed position of the grounds also militates against the accuracy of such tests.

I would here refer to the recommendation made elsewhere in this report in regard to the Arlington estate. The work of testing these new varieties of fruits is too important to have been allowed to lapse. It ought to be resumed at the earliest moment practicable, and such a disposition of the 300 acres of the Arlington estate as is elsewhere proposed would enable the Department to resume its work under the most favorable circumstances.

In the propagation of plants intended for distribution a distinction is made between those of mere ornamental value and those that represent economic products; therefore, the introduction and propagation of specialties, of plants which are either new or rare, so far as relates to the value of their products, or older varieties which commend themselves for particular purposes for which their extension is deemed desirable, are the important considerations which govern operations in this line.

While the requests for plants are unlimited as to kinds, the Department reserves the prerogative of the selection of such as may be adapted to certain localities. In this discrimination the results of experiment with former introductions and distributions are duly considered.

As examples, the records of the Department show that the genus *Eucalyptus*, of reputed anti-malarial value, cannot withstand the climates north of latitude 29°. The quinine-bearing *Cinchonas* have been so far tried throughout the States that localities where further tests are wholly unnecessary are now well defined. The same tests have been made with the tea plant, the coffee plant, with olives, Japan persimmons, pine-apples, etc., so that the climatic conditions for their successful culture are sufficiently known to guide the Department in its further distributions of these plants.

As a main purpose of the Department is that of introducing, or assisting the introduction, of new or but little known useful plants, it will have served this purpose when these plants have either merited the attention of cultivators or have proved to be failures; in the former case

their further propagation is taken up by commercial growers, who can supply all demands, so that the services of the Department are no longer important in that particular plant, and its means can be directed and employed for other purposes of a similar character.

Urgent demands are constantly received from residents of the warmer climates of this country for all kinds of tropical plants, many of which, even if a suitable climate is found for their growth, can only be classed as ornamental plants; but useful plants of this nature, such as the vanilla, the chocolate, and others of similar habits and value, are distributed to some extent for trial; but the portion of this country, if any, suited to these, is very limited indeed.

SEED DIVISION.

The distribution of seeds to experiment stations and agricultural colleges has now become an important part of the work of this Division, and the wisdom of this course is so apparent that the policy of placing seeds of new and presumably valuable plants at the disposal of the officers of these institutions will be sedulously adhered to. From them the Department may reasonably anticipate getting such reports, including such data as the date of sowing or planting, the time of maturing and harvesting, the quantity of seed planted, the amount and quality of the product, the character of the soil and climate, as will enable the Department to arrive at reasonable conclusions as to the relative value of seeds so furnished, so that we may then be more certain of furnishing to our farmers in the various sections represented by these institutions, the seeds best adapted to their wants and most certain to insure them good returns.

With a view to securing the best seeds, I have made a departure from the methods heretofore in vogue by engaging the services of a special agent whose whole duty it is to visit, personally, different sections of the country and inspect, as far as possible, the product of seeds offered to the Department, and to look up such as seem to possess specially desirable characteristics. The work done in this line has more than justified the expediency of undertaking it. The results which may be secured by wise dissemination of seeds are of great value. By the substitution of superior varieties for such as have become deteriorated or diseased, and by the introduction of the seeds of new plants, through the cultivation of which the resources and wealth of our people may be largely increased, the producers of this country can not fail to reap very great benefits.

The distribution of seeds during the present Administration has, of course, not been very extensive, as this covers the season of least activity in such work; but the distribution of winter wheat has this year been greatly increased, and has attained that place in the full distribution which its evident importance warrants. I wish here to empha-

size the necessity of close observation of the products of those countries which compete with ours in the cereal markets of the world, and of procuring from time to time for experiment and analysis in this country the seeds of such varieties grown abroad as seem to have specially desirable qualities. The vast extent of this country, with its great varieties of soil and climate, justifies the belief that there is no cereal grown abroad which can not be equally well grown, and indeed improved, in some sections of this country. In pursuance of this consideration, I have caused to be purchased a suitable quantity of five superior grades of wheat grown on the shores of the Mediterranean, which will be carefully tested and judiciously distributed with due reference to conditions of growth.

In this connection I may state that especial care is being taken to discriminate in the distribution of all seeds according to the varying conditions of soil and climate. In the face of increasing competition, it becomes necessary that we should, in addition to advantages afforded us by cheap lands and facilities for transportation, strenuously guard that guaranteed to us by the superior excellence of our products to those grown elsewhere. This can only be done by constantly seeking out the best that there is, and securing its dissemination in sections of this country where it can best be grown. This excellence must moreover be made so apparent as to be undisputed. The time has come for chemical analysis to aid in determining the relative value of cereals whose merits on the market have hitherto been usually determined simply by the eye, and for this reason I trust the Chemical Division may be so liberally equipped as to enable this Department to carry out a careful comparison between home grown and foreign grains, proving conclusively, as I believe such a test will, the superiority of our cereals for milling purposes over those grown in competing countries.

The employment of a competent expert is contemplated in order that this Department may be enabled to exercise, in reference to cereals, the same duty as to inspection and nomenclature of different varieties which has been so efficiently performed in the botanical and pomological divisions in regard to grasses and fodder, plants and fruits.

In view of the growing tendency in the South to increase its grass products, a tendency which should be fostered by the Government, I have ordered a supply of Bermuda grass for distribution throughout the Southern States. The advantages of this grass for our southern latitudes are manifest and generally recognized, but being a very spare seeder, and the imported seed not always to be had and quite expensive, its cultivation on a large scale has not been feasible. I trust to be able to counteract these disadvantages by a liberal distribution, as it spreads rapidly by its rooting stems when once introduced, and will prove a valuable permanent pasture south of 36° north latitude.

DIVISION OF POMOLOGY.

Two important trips of investigation have been made during the present year. The Pomologist personally visited the State of Florida during the earlier months of the year that he might have a thorough and personal knowledge of the peculiar conditions existing there, and to see the citrus and other fruits in the orchard.

One of the regular employés of the Division was sent, in company with a special agent of national reputation, as an expert scientific pomologist, on an extended tour of investigation through the regions from Texas and Wisconsin to the Pacific coast. Much valuable information and a large collection of specimens of the wild fruits were secured. It is expected that this will materially add to the ability of this Department in assisting in the solution of the question as to what will be done with the arid regions.

The knowledge of those fruits which do or do not grow naturally in the unsettled portions of our country will, in a measure, indicate those of our cultivated kinds that may be expected to succeed or fail in those localities.

More than five hundred packages of fruits have been received within the year, and most of them were sent for the purpose of identification.

This is a matter that requires the most expert knowledge, carefully used, for the variations of climate often so change the size, color, flavor and season of ripening, as to deceive even the most experienced. However, with very few exceptions satisfactory conclusions have been reached.

It is often important, indeed essential, that the name of a fruit be known by the nurseryman or grower, for it would not be possible otherwise to intelligently propagate and distribute the trees or plants, or to cultivate and market the fruit to the best advantage.

It is the constant aim of this Division to keep fully posted as to all new fruits, whether good or bad, and to embody in the annual and special reports a statement as to the real value of each. Almost daily the Pomologist is called upon to pass opinion as to the merits of new varieties, and the greatest caution has to be exercised in the expression of such opinion.

Whenever it is possible to obtain new fruits that promise well they are distributed where they are most likely to succeed best. The Division co-operates with the State Experiment Stations in this regard, and with private experimenters of high repute.

Quite recently the first lot of named varieties of cocoanuts ever introduced into this country was imported from the Philippine Islands by this Division. Several other fruits have been introduced from Europe, India, and Japan, and arrangements have been made for procuring a number more.

THE FOLDING-ROOM.

The increase of labor in the Folding Division for the past few years has been very great. Looking back to the records of the Department prior to 1881, I find that the work in this Division was so light and comparatively unimportant as to not even be made the subject of a separate reference in the Commissioner's annual report. To go back to the date when it first assumed dimensions which seemed to call for such special distinction, 1881, I find that, including the special and miscellaneous reports, the total number mailed in that year by this Division was 259,000. Referring to the list of publications issued during the current year, I find that it has attained for the past nine months the very large number of 472,100. In addition, there is a very large amount of miscellaneous work, the increase in which has been even greater than in the number of reports mailed. In addition to this total of publications received of 472,100, there were also written franks and letters to the number of 801,500; advance sheets for the press, folded and directed, 60,000; packages of envelopes and paper sent to correspondents, 10,530, and return postal-cards mailed to the number of 20,000.

All this great increase of work has had to be performed with little or no increase in clerical force since the date mentioned, with no additional facilities, and I cannot insist too strongly upon the necessity of providing this division with such force and equipment as will enable it to do the work assigned to it promptly and efficiently. It is as objectionable as it is short-sighted that after expending a vast amount of time and labor in the preparation of important documents, the Department should, for want of adequate means, be hampered in its efforts to lay them before the people who need them.

I append a list of the publications issued from this Department during the current year, with the number of each published and distributed:

SUMMARY OF PUBLICATIONS OF THE U. S. DEPARTMENT OF AGRICULTURE,

Issued and distributed from January 1, 1889, to October 31, 1889 (nine months).

Annual Report, 1888.....	30,000
Statistical reports:	
Monthly reports, new series, Nos. 59 to 67, inclusive, 19,000 of each.....	171,000
Album of agricultural statistics.....	10,000
	<hr/> 184,000
Botanical Division:	
Bulletins Nos. 8, 9, and 10, 5,000 each.....	15,000
Special bulletin on the agricultural grasses of the United States.....	10,000
	<hr/> 25,000
Section of Vegetable Pathology:	
Nos. 1, 2, and 3 of the Journal of Mycology.....	4,100
Circular No. 8, pear-leaf blight, and apple powdery mildew ...	5,000
Special reports on peach blight and potato rot	2,000
	<hr/> 11,100

Chemical Division :

Bulletin No. 13, parts 4 and 5, 10,000 each	20,000	
Bulletins Nos. 20 and 21, 10,000 each	20,000	
Bulletins Nos. 22 and 23, 5,000 each	10,000	
		<hr/> 50,000

Entomological Division :

Insect Life, Nos. 7 to 12, inclusive, of vol. I, 5,000 each	30,000	
Insect Life, Nos. 1 to 4 of vol. II, 5,000 each	20,000	
		<hr/> 50,000

Forestry Division :

Bulletin No. 3	10,000	
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Bureau of Animal Industry :

Report on hog cholera	10,000	
Report of U. S. Board of Inquiry concerning epizootic diseases of swine	5,000	
		<hr/> 15,000

Ornithological Division :

Report of ornithologist	2,000	
Bulletin No. 1, English sparrow	15,000	
		<hr/> 17,000

Office of Experiment Stations :

Bulletins Nos. 1 and 2, 5,000 each	10,000	
Bulletin No. 3	10,000	
Miscellaneous Bulletin No. 1	5,000	
Farmers' Bulletin	50,000	
Special Circular No. 7	5,000	
		<hr/> 80,000

Total	472,100	
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THE LIBRARY.

An essential to efficient work is a well-selected and well-stocked library, which shall cover all the lines of inquiry of agriculture and agricultural science. It is useless to attempt to do first-class work that shall pass the scrutiny of the sharpest criticisms without having at hand what has been done and said in the past, and what is constantly coming in from a prolific press. Our library, of something like 20,000 volumes only, is specially weak in the Government publications, some of which are of rare merit; in the agricultural reports of the several States, for which there is great demand; in general agriculture, without which no one can well treat agriculture historically; in foreign agricultural reports and publications, without which in these times of cosmopolitan thought and work no such library as ours is properly equipped, and in several lines specially needed by the respective Divisions of the Department. All the Divisions need strengthening. The library has but a fugitive volume or two of any herd book, and is so woefully lacking in many lines that I refrain from further specifying.

In the change of the library from the old room, which was so small as to compel a suspension in a measure of the collection of more books and the rejection of the Government publications, to ampler quarters,

it was, for want of help, badly disarranged, so that what we had was so difficult to find that it was almost a bar to any attempt to make a comprehensive study of any topic. A special effort has been made to rearrange and reclassify it, and we now hope for a more satisfactory use of what we have, and for an appropriation sufficient to fill up the gaps and place it on a proper footing.

THE MUSEUM.

I am making an effort to place the Museum on a broader basis, not so much in the line of curiosities, which will not be ignored, as in the exhibit of the agricultural products of this and other lands. I am also endeavoring to procure samples of the four hundred and more supposed varieties of wheat grown in this country; likewise of all the varieties of corn, oats, and other cereals. With the collection of such an exhibit must be associated an expert, who shall, as elsewhere stated, be able to detect synonyms, and who shall be competent to pass judgment upon the changes marking the growth of the same variety in different latitudes and under different conditions of soil and climate. The importance of having a standard for the naming of the varieties is becoming more and more apparent. This is true likewise in relation to fruits. The new varieties now being so rapidly developed by the horticulturists of the country will soon swamp their nomenclature unless some place for scientific classification be provided, and it is suggested that the proper place is in our Museum, which should become the great agricultural museum of the country.

The Museum is now specially strong in native woods, and has a fair exhibit of wools and textile fibers. The latter should be largely extended. The fabrics from agricultural products should have a much larger display, and models or drawings of agricultural implements, both ancient and modern, should find a place in it. In short, this Museum should at the same time be an instructive object-lesson of the agricultural products and possibilities of the country, and should be a standard for accurate knowledge and for practical and scientific reference.

AMERICAN AGRICULTURE AT THE PARIS EXPOSITION.

It must be gratifying to all American citizens to note the tribute paid to the excellence of our American agricultural products at the recent Paris Exposition. The late date at which the appropriation was made available for the work assigned to this Department was a serious drawback, but in spite of this fact the high place of American agriculture in the estimation of eminent foreign authorities is attested by the liberal share of awards conferred at Paris upon the United States agricultural exhibit. The thanks of the Department are due to those public-spirited citizens who cheerfully contributed in response to its invitation towards this exhibit.

CORRESPONDENCE.

The growing appreciation of the Department among the people has no better index than the increasing number of letters received. All the Divisions are nearly overwhelmed with the correspondence referred to them for consideration and reply, and from month to month and year to year the volume of it grows so as at times to almost cause suspension of regular scientific work.

These letters in large proportion are not the merely formal requests incident to departmental work, which any experienced clerk can answer, and which are increasing with accelerating rapidity, but relate to every possible question, from the most frivolous to the most abstruse, some of which may require days and perhaps weeks and the attention of several Divisions to investigate and properly answer. The Department, as now administered, is a bureau of information on all subjects relating to agriculture—from the weather, the crops, to the ravages of the smallest insect and the most minute fungus. The people are appreciating this personal information and this consideration of their difficulties, and we attempt to answer their inquiries promptly and thoroughly, promptness at times being the essence of value to the inquirer. As an indication of the magnitude of this line of work the reports to me show that there have been received and answered since January 1, 1889, the following number of letters :

By the Bureau of Animal Industry.....	2,000
By the Division of Botany.....	957
By the Office of Experiment Stations.....	4,220
By the Division of Pomology.....	1,600
By the Division of Entomology	2,851
By the Section of Silk culture.....	5,110
By the Section of Vegetable Pathology.....	2,000
By the Division of Ornithology and Mammalogy.....	3,254
By the Division of Forestry	1,000
By the Division of Accounts	5,875
By the Division of Chemistry	1,477
By the Division of Statistics.....	4,530
By the Division of Microscopy	550
By the Folding-room.....	1,500
By the Office of the Secretary	3,000
By the Office of the Assistant Secretary, since instituted, February 9, 1889..	750
Total.....	40,668

It must be borne in mind that these letters come from all sections of the country, from all classes and conditions, inspired by the wants of the most diversified country on the globe. This Department is for the people, for the struggling farmer, and there is no desire to abridge this labor, but my wish is to bring our work nearer their personal interests, and to make them feel, in every way possible, that we are helping them in their struggles, under, at times, adverse circumstances.

AGRICULTURAL ORGANIZATION.

In 1885 this Department prepared a directory of the officers of agricultural associations and organizations, local, State, and national, which then included some 5,000 names. I have just completed a similar work for the current year which includes over 9,000 names. These associations represent so many centers of agricultural thought and effort at self-improvement, including a membership composed almost exclusively of practical farmers associated together in an effort to better themselves by improvement in methods and by the diffusion of greater light on the farming industry. I can not conceive of any more important duty devolving on this Department than that of giving aid and encouragement to these farmers in their effort to better their condition, an effort whose success means an addition to the wealth of the country. The least that should be expected of this Department is that it should furnish one set of its publications to any or all of these associations for the use of its members, and yet the largest printing appropriation ever devoted to the service of this Department would be quite inadequate to the purpose. To such an extent, however, as the liberality of Congress will permit, I shall make it my business to cherish to the utmost all such societies as are the outcome of a determined effort on the part of the farmers to help themselves. It is to be regretted that the narrow limits of the current year's printing fund forbids the publication of this directory for the present.

The figures here given afford eloquent testimony to the remarkable progress in the direction of self effort on the part of the farmers themselves. An increase of these organizations in four years at the rate of 1,000 a year is an evidence of this spirit which it should be the first duty of the Department to encourage. Another gratifying illustration of the same fact is the development of the

FARMERS' INSTITUTE.

Referring to these most useful meetings, I can not allow my first report as Secretary of Agriculture to go out without calling special attention to them. I regard this institute work as one of the most beneficent movements the agricultural history of this country ever has witnessed. My attention has been called to a bill introduced at the last session of Congress appropriating a liberal sum to establish, in connection with this Department, a division whose special duty it shall be to aid in the work of farmers' institutes throughout the country. I would merely say on this subject that it is a matter of no little gratification to me that this great work has nowhere been more fully tried than in my own State, where it was my privilege and pleasure to encourage it in every legitimate way, and nowhere has it reaped a more abundant harvest than in Wisconsin. Experience there and in other

States has fully demonstrated the extraordinary benefits arising from the institutes, and I am strongly of the opinion that, without going into details as to the precise way in which aid to the movement should be furnished, the National Government, in pursuance of the policy so strongly marked out by the establishment of the agricultural colleges and experiment stations, should put it in the power of the Department of Agriculture to foster and encourage the work of the institutes in the various States and Territories. The institutes have been justly designated the farmers' colleges. No truer title was ever conferred. I will only add that the strongest lever to raise and uphold the work of superior agricultural education represented by our system of agricultural colleges and experiment stations is to be found in this institute and kindred work.

BUREAU OF ANIMAL INDUSTRY.

The work of the Bureau in the control and eradication of contagious pleuro-pneumonia has been vigorously, and, I am happy to state, successfully prosecuted. Thanks to these vigorous measures, the contagion has not spread to any new districts, and the infected territory has been so steadily reduced in extent that it is now entirely confined to the States mentioned below. In New York the disease has been eradicated from Orange and New York Counties, and to-day is only found in Kings and Queens Counties, and is there much less prevalent than it was a year ago. The reports from New Jersey indicate that the disease has been practically stamped out, and there is every reason to believe that a few months of supervision will remove the last trace of the contagion. Only two small outbreaks have been reported from Pennsylvania within the past year. The first was effectually stamped out and measures promptly taken in regard to the second on receipt of the report of the State Veterinarian, and the slaughter of two affected animals seems to have removed all apprehension of further danger. But three affected herds have been found in Maryland the past six months, and there seems to be no likelihood of further trouble there. My intention is to maintain a sufficient force of inspectors in each of these States to establish a strict supervision of cattle for three or four months after the last appearance of the disease, thus insuring against any subsequent development of it. It is gratifying to recall that the effectual measures taken by this Department have almost entirely prevented the periodical rumors and subsequent panics among those engaged in the cattle trade which a few years ago were so frequent and so disastrous to the cattle industry.

The number of cattle purchased for slaughter from July 1, 1888, to June 30, 1889, in order to secure the eradication of the plague, has been: In New York, 1,460 diseased, 3,011 exposed; in New Jersey, 255 diseased and 880 exposed; in Pennsylvania, 15 diseased, 68 exposed; and in Maryland, 217 diseased, 624 exposed.

The number purchased per month gradually decreased until it became

much less than during corresponding periods of the preceding year. The total number of cattle found affected during the last-mentioned period with pleuro-pneumonia on *post-mortem* examination was: In New York, 1,561; in New Jersey, 302; in Pennsylvania, 29; in Maryland, 242; a total of 2,134. Reports received since June 30, 1889, indicate, as I have said, that the vigorous measures adopted have proved very effectual, and justify the most sanguine hopes in regard to the present control and complete eradication of the disease at an early date.

The large number of cases of the malignant disease disseminated by Southern cattle, known as Texas or splenic fever, led me to make regulations requiring special pens to be set apart in the leading stock-yards for the dangerous cattle; also providing for the cleaning and disinfection of the cars which had transported them. This has greatly reduced the losses, and when the regulations are perfected and thoroughly carried out the disease should be almost entirely prevented. With this malady the infection is generally spread through the channels of interstate commerce, and for that reason can only be effectually controlled by the Federal Government. For the protection of our citizens who purchase cattle in the great markets of the country, no less than for the reputation of the dressed beef which has become such an important factor in our domestic and foreign trade, the legislation relating to this subject should be ample and clearly defined.

MEAT INSPECTION.

Rumors of cattle diseases in this country having little foundation, if any, in fact, continue to be widely circulated in foreign countries to the great injury of our cattle trade. The existence of a demand for our surplus meat products in these countries is nevertheless plainly evident, and it is in the highest degree desirable that the Government of this country should adopt all means in its power to secure for our producers every opportunity to compete on fair terms in the markets of the world for the disposal of their surplus production. I would therefore insist most strongly upon the necessity of such a national inspection of cattle at the time of slaughter as would not only secure the condemnation of carcasses unfit for food, if there be any, and guaranty the accepted product as untainted by disease, but which should enable the national authorities to promptly discover any cattle-disease centers, thus putting it in the power of the Department to take immediate steps for its control and eradication.

While earnestly repudiating the captious objections made on the part of foreign authorities to the wholesomeness of our meat products, still, as long as we neglect to take the precautions universally adopted by the governments of those countries in which we seek a market for these products, and leave it to the officials of other countries to inspect our live cattle or our meats, it is impossible for us to present as forcible arguments as we could otherwise do against restrictions on our trade,

these foreign governments claiming, with some show of reason, that they have better opportunities for learning of disease among American cattle than are enjoyed by the American Government itself. It is time to put a stop to this anomalous condition, and I therefore earnestly recommend such an amendment to the law under which the Bureau is at present organized as will provide for such official national inspection as shall guaranty the fitness of our meat products for food consumption under the seal of the United States Government.

In connection with such amendment, I would also suggest that it be made adequate to cover such an observation in, and supervision of, the great meat markets of this country as will permit this Department to supply the stock raisers of this country reliable information as to the character of stock commanding the highest prices. I conceive it to be of the greatest practical value to stock-raisers and farmers to know definitely what are the precise attributes which procure a price for certain kinds of stock far above the average, and whether the effect of such characteristics as weight, age, and quality, etc., upon the price, vary with different seasons of the year. In a word, I desire that the Bureau of Animal Industry be enabled to supply to the farmers such information relating to their industry as it is impossible for them to obtain by their own unaided efforts.

The investigations of the Bureau have been the means of determining the nature and proper treatment of many outbreaks of disease among our domesticated animals, which would otherwise have excited great alarm and led to heavy losses. The scientific researches, though they have accomplished much, are not yet by any means complete, and should be continued and extended till the field is thoroughly covered. The laboratory facilities of the Department are utterly inadequate for conducting this work according to the exacting requirements of modern science. Some diseases are communicable to mankind and can not be investigated because the laboratories are not sufficiently isolated from the remainder of the building, where many persons are employed.

DISEASE EXPERIMENT STATION.

The experimental station now established on rented ground requires enlargement and extension and all the facilities that science can provide for the effectual prosecution of this most important work, which means the saving of many millions of dollars annually to the producers of this country. I would propose, therefore, that 300 acres of the Arlington estate should be set aside for the use of this Department. This land is now unemployed, and being the property of the Government should be made available without further expense than that of removing to it the plant and equipment of the present station. I wish to earnestly insist upon the fact that foreign countries furnishing the most formidable competition in the markets of the world to our American

producers have adopted the most approved means which science affords to secure for their products an immunity which will procure for them the confidence of purchasers the world over. In work of this kind the United States Government must not be behind any other; indeed, in view of the importance of the interests involved, and American determination to be ever in the van, this country ought to lead all others in the prosecution of the work I have indicated.

To meet the many demands for more information in regard to animal diseases, a series of works are now in preparation giving a systematic statement of the current knowledge on the subject, prepared in popular form. Such publications, if properly revised and reissued from time to time, so that they may give the latest attainable information, will be of permanent and increasing value.

In addition to its other duties, the Bureau has had charge of the quarantine stations of the country. I have made certain needed improvements at some of the stations in order to better provide for the comfort and care of imported cattle while in quarantine. The stations have been successfully maintained and no case of disease has been introduced into the country during the year.

The work of the Bureau as a whole has been of great value, but it has been too restricted in its nature, and it should be extended so that all the different branches of the animal industry would be properly represented in the investigations; and this naturally leads me to a consideration of

THE DAIRY INTERESTS.

The dairy interest is attaining very large prominence in American agriculture. Between 1850 and 1880 the census aggregates of cows on farms increased from 6,000,000 to 12,000,000, and the last estimates of this Department exceeded 15,000,000, including those in towns or villages, and the grand aggregate must exceed 16,000,000. The last census reported a butter product of 806,682,071 pounds. It was not less than 900,000,000 pounds, inclusive of cows not on farms. If the increase has been equal to the increment of population, the present aggregate can not be much less than 1,300,000,000 pounds. The cheese product may approximate 400,000,000 pounds, of which a goodly portion is exported, but the exports of butter have been small in amount and poor in quality.

I propose to establish in the Bureau of Animal Industry a special Division devoted exclusively to the service of this great dairy interest. Dairying, when properly conducted, is unquestionably a most profitable branch of farming. The fact, also, that it supplies our people with one of the most complete and healthful of all foods gives it another claim to our consideration. Such products as butter and cheese are admirably adapted for transportation to distant markets, permitting, as they do, a remarkable concentration of bulk in proportion to value, and taking comparatively little from the fertility of the soil.

A car-load of butter can be transported with comparatively little more expense than a car-load of steers, although the first represents five or six times the value of the latter. Foreign dairymen find profitable markets for their surplus product in Great Britain and in South America, and that fact suggests a similar opportunity for our American dairymen, emphasized by the recent award at Paris of a gold medal to American butter.

In an effort, however, to extend our butter and cheese trade in foreign markets, I wish to insist on the fact that absolute purity must be maintained and that the tastes of the foreign consumers must be consulted, not only as to keeping qualities and flavor, but also as to form or package and color. To enable our dairymen to succeed in this they must be informed as to these peculiarities of foreign taste, and such information this Department should be enabled, with the assistance of our consular service, to supply. The existence of a steady home demand for the superior grades of butter indicates that in this industry there is no danger of overloading the market. The extraordinary improvements introduced of late years into the process of butter-making merit a closer scrutiny and observation than the individual farmer and dairyman can afford to give, and which it should be within the province of this Department to undertake for his benefit. The plans I have formed for the encouragement of our butter interest imperatively demand the establishment of such a special division devoted to this subject.

POULTRY.

The time has come when the importance of the poultry interests should be recognized in this Department. The poultry products of the United States had a farm value of at least \$200,000,000 last year, and no less than 16,000,000 dozen eggs were imported at a first cost of over 15 cents per dozen, or nearly \$2,500,000, while the average annual value of such importation during the past four years has been \$2,216,326. Such facts emphasize the necessity for encouraging the increase of domestic fowls of all kinds, and they further indicate beyond question that this industry is important enough to demand the special consideration of this Department.

The economics of rearing and feeding, the peculiar adaptation of the breeds to specific uses, merit more official attention than has heretofore been given to these subjects.

SHEEP AND WOOL.

The importance of sheep-husbandry demands the especial consideration of the Department at this time. The economics of breeding and feeding, with reference to a growing branch of the meat supply, requires the aid of scientific experiment and practical skill to produce the largest equivalent of flesh for the feed consumed.

The rapid increase and consumption of mutton is indicated by an enlargement of the receipt of sheep at Chicago and St. Louis, from 544,627 in 1875 to 1,971,683 in 1888. The increase in New York during the same period amounts to 750,000.

A canvass of the principal cities of the country would evidently show that consumption has doubled, a rate of increase twice as rapid as the advance of population. The healthfulness of mutton, its suitability for summer use in warm climates, and its growing popularity as highly-fed animals of the best mutton breeds become more common in our markets, contribute to the rapidly enlarging demand. It is important that this branch of sheep raising should receive greater attention.

The wool industry probably represents \$300,000,000 per annum, and the native wool product is four times as large as in 1860, while the average fleece weighs as much as two of that date. Prior to that time there was a slow increase of numbers and small advances in quality or weight. Large classes of goods which could not be produced in this country, as was claimed by importers and half believed by consumers, are now produced here in nearly full supply of the home demand. Their manufacture was rendered possible first by the effect of the war premium on gold and afterwards by the influence of the tariff of 1867.

The result of this development has been that growers have received hundreds of millions of dollars which would otherwise have gone to the Argentine Republic, Australia, and other countries. It has created a reliable supply of home-grown raw material for our manufactures, and an even and better quality of wool than that handled by nations depending on the growth of all climates, a better average quality of goods than those of foreign manufacturers, and a steady reduction of price through competition.

I respectfully call your attention to a fact full of significance in this connection. There has recently been serious interruption to the prosperity of wool-growers. Since the reduction of the tariff of 1883 the numbers of sheep have apparently been reduced about seven millions, and the importation of wool has increased from 78,350,651 pounds in 1884 to 126,487,729 the past year. Upon the sheep and wool industry of this country the burden of that loss has fallen, while our manufacturers have contributed so much additional money to foreign markets. Wool-growers are despondent in view of low prices of wool, and their interests are threatened in consequence.

On behalf of this industry I commend these facts to you, and should they be submitted to Congress I ask for them intelligent and careful consideration.

It is to be assumed that when Congress, in its wisdom, raised this Department to its present dignity, and made its chief a Cabinet officer, the intention of our law-makers was not simply to add the luster of official dignity to an industry already dignified by the labor of its votaries, but

to give it added influence and power for good in their behalf. It will not be amiss, then, if here and now I venture to offer some facts no doubt already familiar to you, but which strikingly emphasize the vast aggregate importance of the interests which it is the primary object of this Department to serve.

As far back as 1880 the value of the farms of the United States exceeded ten thousand million dollars. To the unremitting industry of their owners these farms yielded an aggregate annual value of nearly four thousand million dollars, in the production of which a vast population of nearly eight million of toilers utilized nearly half a billion worth of farm implements. The value of live-stock on farms, estimated in the last census to be worth over one thousand five hundred million of dollars, is shown by the reliable statistics collected by this Department to be worth to day two thousand five hundred and seven million dollars. A low estimate of the number of farmers and farm laborers employed on our five million farms places it at nearly ten million persons, representing thirty million people, or nearly one-half of our present population.

These few figures are surely enough in themselves to convince every thoughtful man of the responsibilities thrown upon the Department of Agriculture, but even they do not permit of a realization of their full portent, unless the correlation of agriculture with the other industries of this country be properly considered. It may be broadly stated that upon the productiveness of our agriculture and the prosperity of our farmers the entire wealth and prosperity of the whole nation depend. The trade and commerce of this vast country of which we so proudly boast, the transportation facilities so wonderfully developed during the past quarter of a century, are all possible only because the underlying industry of them all, agriculture, has called them into being. Even the product of our mines is only valuable because of the commerce and the wealth created by our agriculture. These are strong assertions, but they are assertions fully justified by the facts and recognized the world over by the highest authorities in political economy.

No wonder, then, that I appeal earnestly and confidently for such support as will enable me to acquit myself creditably in the position to which your confidence has assigned me, and to see to it that the great work entrusted to my direction is efficiently performed. Throughout the country from time to time, and at all times in some parts of this great country we find agriculture suffering from depression, to diagnose the cause of which is oftentimes a difficult matter for publicists and political economists, while our law-makers, both State and national, find their most difficult task in the delicate duty of so adjusting the respective rights of every class of our citizens as to secure to each the full benefits of their industry. This is neither the time nor place to analyze causes of agricultural depression nor to discuss at length the many panaceas proposed for its relief, but I do feel that the agencies which already exist

primarily for the benefit of the industrial classes must be extended to the full for the advantage of the tiller of the soil.

Protection of American industries is one of the rock-rooted principles of the great party which this administration represents. To all the protection that wise tariff laws can afford, and to the fullest extent compatible with the equal rights of all classes, which is a fundamental principle of republican institutions, the farming industry justly claims its inalienable right. In the diversification of agriculture, which, I am thankful to say, has taken place during the past few years, and which I hope it will be in my power to greatly encourage, the farmer has been enabled to produce many articles comparatively unknown as a home product twenty years ago. For all such articles as our own soil can produce the farmer justly asks that protection which will insure to him all the benefits of our home market.

Another agency looking to the important well-being of the farmer is that which was called into being by the creation of this Department, an agency which, energetically and judiciously directed, will not fail of its purpose. Great as are our crops in the aggregate, it must be admitted that our broad acres are not as prolific as they should be, and I am convinced that, with the aid which can be afforded to agriculture by carrying out to the full the purposes for which this Department exists, and thanks to the rapid growth of intelligence and the remarkable efforts at self-help among our farmers, the yield of every tillable acre in this country can be increased 50 per cent. More than this will science, properly directed, enable us to accomplish, for millions of acres at present unproductive can, by its application, be rendered fertile. The great nations of Europe strain every effort to make science the hand-maid of war; let it be the glory of the great American people to make science the hand-maid of agriculture.

Such is the history of the year's operations of this Department, and such the condition and needs of the interests committed to its charge. I conclude this report with the expression of my thanks for the hearty co-operation and faithful service which the officers, clerks, employés, and correspondents of the Department have at all times given me.

Very respectfully, your obedient servant,

J. M. RUSK,
Secretary

R E P O R T

OF THE

SECRETARY OF AGRICULTURE

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1893

REPORT
OF THE
SECRETARY OF AGRICULTURE.

DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., October 25, 1890.

To the PRESIDENT:

I have the honor to submit my Second Annual Report as Secretary of Agriculture.

I deem it to be my first duty in making this report to congratulate you and the country at large upon the generally improved outlook in agricultural matters. At no time in the history of this country has there been so much agitation among the farmers as a class as during the period which has elapsed since I had the honor to submit to you my first report. The causes of this widespread agitation have been so varied and so numerous that to attempt to specify them all would be as tedious as it would be unnecessary in a report of this character. I will only refer to such of the most prominent causes as for various reasons seem to require special mention here.

Naturally the first place in this brief enumeration belongs to a depressed condition of agriculture prevailing at the time that you assumed office, the result of a slight but steady diminution of the prices of most of our staple agricultural products, a reduction which had been going on for some years, and which, therefore, has amounted in the aggregate to a considerable percentage of the average crop values. Severely as such a depression must necessarily have been felt by a class who measure even their prosperity by a very moderate standard of profit, it has not been without its good results.

The attention of the country was thoroughly awakened to the farmer's condition, and agricultural matters were very properly made the subject of special consideration by Congress. The subject was discussed in the press, the views of the farmers themselves were made known, and it is gratifying to be able to point out that to-day the cloud which for some years seemed to rest gloomily upon American agriculture has

been lightened, while the wise economic legislation already secured holds out still brighter promise for the future. As an earnest of this statement, I subjoin a brief table, showing prices of some of our staple agricultural products to-day and a year ago.

Prices of leading agricultural products at Chicago, October 16.

Articles.	1889.	1890.
Corn .....per bushel..	\$0.30 $\frac{1}{2}$ to \$0.31	\$0.50 to \$0.50 $\frac{1}{2}$
Wheat.....do....	.80 $\frac{1}{2}$.81 $\frac{1}{2}$	1.00 1.00 $\frac{3}{4}$
Oats.....do....	.18 $\frac{3}{4}$.19 $\frac{1}{4}$	.42 .43
Barley.....do....	.63	.78
Flaxseed.....do....	1.27 1.27 $\frac{1}{2}$	1.45 $\frac{1}{2}$ 1.46
Buckwheat.....do....	.38 .45	.55 .65
Hogs.....per 100 pounds..	3.85 4.20	3.85 4.50
Cattle, choice.....do....	4.00 5.05	4.75 5.30
Sheep, Western.....do....	3.50 4.20	3.00 4.60

The recent legislation looking to the restoration of the bimetallic standard of our currency, and the consequent enhancement of the value of silver, has unquestionably had much to do with the recent advance in the price of cereals. The same cause has advanced the price of wheat in Russia and India, and in the same degree reduced their power of competition. English gold was formerly exchanged for cheap silver, and wheat purchased with the cheaper metal was sold in Great Britain for gold. Much of this advantage is lost by the appreciation of silver in those countries. It is reasonable, therefore, to expect much higher prices for wheat than have been received in recent years.

In my last report I ventured to appeal most earnestly for a larger measure of tariff protection for the farming industry. "For all such articles as our own soil will produce, the farmer justly asks that protection which will insure to him all the benefits of our home market." Such was the language with which I concluded my appeal on his behalf. I am thankful to say that it has been in a very large measure heeded; and, admitting to the fullest extent the place to which natural causes are entitled in assigning reasons for the higher prices now prevailing for agricultural products, it is impossible not to see the beneficial influence of the tariff protection awarded to the farmer under the present law. A comparison of the duties under the present law on some of the agricultural products heretofore imported in considerable amounts with the rates of duty imposed on them under the old law will illustrate this in a striking manner.

Agricultural imports, fiscal year ending June 30, 1890, with change in tariff duties.

	Value.	Old duty.	New duty.
Animals and animal products:			
Cattle	\$244, 747	20 per cent ad val.	{ Over one year, \$10. { Under one year, \$2.
Horses	4, 840, 485	do	\$30, or 30 per cent if value over \$150.
Sheep	1, 268, 209	do	{ Over one year, \$1.50. { Under one year, \$0.75.
Cheese	1, 295, 506	4c. per lb.	6c. per lb.
Eggs	2, 074, 912	Free	5c. per dozen.
Wools	15, 264, 083		
Class 1 (above and below 30c. per lb.)		10c. and 12c	11 cents.
Class 2 (above and below 30c. per lb.)		do	12 cents.
Class 3 (above and below 12c. per lb.)		2½c. and 5c	{ At 13c. per lb., 32 p. ct. { Over 13 c., 50 p. c. ad val.
Flax	2, 188, 021		
Straw		\$5 per ton	\$5 per ton.
Not hackled		\$20 per ton	1c. per lb.
Dressed line		\$40 per ton	3c. per lb.
Tow		\$10 per ton	1½c. per lb.
Barley	5, 629, 849	10c. per bush	30c. per bush.
Hay	1, 143, 445	\$2 per ton	\$4 per ton.
Hops	1, 053, 616	8c. per lb.	15c. per lb.
Tobacco	17, 605, 192		
Unstemmed (leaf)		75c. per lb.	\$2 per lb.
Stemmed (leaf)		\$1 per lb.	\$2.75 per lb.
All other		35c. per lb.	{ Stemmed, 50c. per lb. { Unstemmed, 35c. per lb.
Potatoes	1, 365, 898	15c. per bush	25c. per bush.
Wines	8, 859, 956		
Champagne:			
Bottles between pint and quart		\$7 per doz	\$8 per doz.
Bottles between half pint and pint		\$3.50 per doz	\$4 per doz.
Bottles less than half pint		\$1.75 per doz	\$2 per doz.

We have a strong assurance in the recent increase of values of meat products, and the circumstances which now environ production, of continued prosperity of stock-raising. New industries now in process of development will increase the ability of consumers to purchase meats; and better protection of wool will open larger domestic markets, as it has already advanced prices. There is an increasing interest in the production of mutton in the central West, and of early lambs in the populous East, indications of progress that promise increase of profit in sheep husbandry. Of chief interest naturally to the stock-raisers of this country are the export trade in animals and their products, and the possibilities of still further relieving our home markets of these products by extending our markets abroad.

THE EXPORT TRADE IN ANIMALS AND THEIR PRODUCTS.

Step by step as it were with the vigorous prosecution of the work of exterminating pleuro-pneumonia and controlling Texas fever, and with a more general appreciation of the benefits derived from a judicious exercise of the powers conferred on this Department, we find a gratifying improvement in the export trade in live animals. The total value of animals and fowls exported for the fiscal year ending June 30, 1890, was over \$33,000,000, an increase of something over \$15,000,000 as compared with the year previous. The increase in the number of cattle was from 205,786 in 1889 to 394,836 in 1890, while the

number of hogs exported increased from 45,128 to 91,148, over 100 per cent. In horses there was a slight reduction of exports, far more than counterbalanced, however, by the large increase in the number of mules exported. In the number of sheep exported there was a decrease.

A very large increase is shown in the export trade in beef and hog products, while in dairy products the export trade in butter was especially gratifying, the figures for 1889 being 15,505,978, and in 1890 29,748,042 pounds. The increase in the value of meat and dairy products exported between 1889 and 1890 was over \$32,000,000. At a time when our domestic markets are overcrowded with animals and their products, this increase in the export trade is very encouraging. The prices realized abroad have as a rule been good, and but for the unjust restrictions placed upon both animal and meat products abroad the increase in the amount exported would have been much greater. Experimental shipments of cattle to Germany and Belgium were made during the year with favorable results, but excessive duties and the quarantine restrictions which were immediately imposed at once destroyed this trade. A careful review of the trade shows how urgent it is that we should secure more favorable regulations in the chief European countries in regard to our exports of animals and animal products. The first step towards the accomplishment of this object was necessarily to secure as far as possible the absolute immunity of our own cattle from disease.

ERADICATION OF PLEURO-PNEUMONIA.

The regulations for the eradication of contagious pleuro-pneumonia have been vigorously enforced during the entire year, and rapid progress has been made. In New York no cases have occurred during the year ending June 30, 1890, except on Long Island. There have been no cases in Maryland since October, 1889. Pennsylvania has remained free from the disease during the entire year. In both Maryland and Pennsylvania constant inspection has been maintained and the complete eradication of the contagion thereby assured. During the two months of May and June, 1890, but 13 affected animals were purchased in the whole infected district as compared with an average of $71\frac{1}{2}$ per month during the preceding ten months. At this writing it would seem that the disease is practically banished from American soil, though the length of time which has elapsed since the last case of the disease was noted by the inspectors has been hardly sufficient to warrant a formal official declaration to this effect.

INSPECTION OF GREAT BRITAIN.

The vigor with which the work of exterminating pleuro-pneumonia was carried on would nevertheless, as far as our export trade was concerned, have been comparatively ineffectual unless simultaneously with

its eradication in this country we were able to convince Great Britain and other European governments of the progress made in ridding the the United States of this disease. Early last winter, therefore, I solicited the aid of the State Department in opening negotiations through Minister Lincoln with the British Government, looking to an arrangement which I deemed extremely desirable with a view to putting an end to the frequent allegations that cases of contagious pleuro-pneumonia existed among American cattle shipped to British ports.

The circumstances under which these allegations were made convinced me of the absolute necessity that this Department should be represented at the inspections made of our cattle on landing in Great Britain. Thanks to the cordial coöperation of the State Department and the intelligent activity displayed in the matter by Minister Lincoln, I finally obtained the privilege of appointing veterinary inspectors representing this Department, to be resident in Great Britain, who were to be allowed every facility in participating with the British inspecting officers in the work of inspecting American cattle landed in British ports. As soon as this privilege was secured I appointed three competent officers for this responsible duty and dispatched them to Great Britain in charge of the Chief of the Bureau of Animal Industry, Dr. Salmon, who remained with them until their duties were clearly defined and the best means decided upon to enable them to carry on their work effectually and in harmony with the British authorities. This transatlantic inspection has been in force for the past two months, and I am happy to be able to state that since it was instituted not a single case has been reported of contagious pleuro-pneumonia among American cattle landed in Great Britain. Indeed, I am now informed that not a single case has been reported by the British authorities since March last.

At the same time that I presented this matter to the attention of the Secretary of State I also placed before him facts bearing upon our meat export trade, showing conclusively the utterly groundless nature of the charges made by other European governments in regard to the unwholesomeness of our meat, but especially of our pork products. I am happy to state that this matter was taken up by the State Department with the same cordiality that characterized its action in regard to our export of live cattle, and that the facts supplied by me to that Department were laid before the foreign governments by our respective ministers so clearly and with such force as will, I am sure, carry considerable weight in the further consideration of this subject by the governments in question.

INSPECTION OF EXPORTED ANIMALS.

The act of August 30, 1890, provides for the inspection of all exported cattle, sheep, and swine. The amount of work required to accomplish this is indicated by the fact that during the year ending June 30, 1890,

the number of these animals exported was as follows: Cattle, 394,836 head; hogs, 91,148 head; sheep, 67,521 head. Rules and regulations for this service have been prepared and the inspection is now being made. The necessity of this inspection is shown by the exclusion of American cattle, sheep, and swine from European markets on the plea of the danger that disease will be introduced by them. While this inspection alone might not be accepted as in all cases giving a complete guaranty against the appearance of disease during the voyage, it is an important step in this direction, and will give us the means of knowing officially the condition of the animals as they leave our ports. In connection with the inspection recently established by me at the foreign animal wharves of Great Britain, it will also enable us to trace back animals which may be found affected there, so that the nature of their malady may be determined, and if found contagious the proper measures will be enforced for its eradication.

REGULATIONS REGARDING TEXAS FEVER.

The regulations regarding Texas fever, which went into effect on March 15, though carefully formulated so as to allow the free movement of Southern cattle to market, have been on the whole well observed, and the result has been a marked decrease in the number of cases of Texas fever occurring on farms, in stock yards, or on vessels carrying export cattle. One of the largest buyers and exporters of cattle in the United States reports that, whereas a year ago he dared not buy cattle for feeding or export in the stock yards, but was obliged to go to the farms where he could get evidence that they had not been exposed, this year, on the contrary, he has purchased such animals at the stock yards without fear. Last year his losses from Texas fever, in spite of his precautions in buying, were considerable; the present summer he has not lost one from this cause. He further states that, owing to the immunity from this disease, insurance rates have been reduced from \$8 to \$3.50 on every \$100 worth of cattle, this alone representing a saving of over \$1,000,000 on export cattle. Owing to lack of authority under existing laws, I have, however, been unable in some cases to enforce these regulations, and there is at present no penalty which can be applied in such cases. Owing to such disregard, some cases have occurred of Texas fever imparted to valuable thoroughbred cattle, and these have since died from the effects of the disease.

Proper facilities for separating the two classes of cattle are still lacking at the ports on the Atlantic seaboard, and as a consequence the disease has occasionally appeared among export cattle on their voyage to foreign countries. The influence of this upon the trade is very bad. It is being cited in Great Britain as affording good reason for their continuing the prohibition of the introduction of live cattle from this country. Ample power to compel immediate remedy of this condition of things is therefore urgently needed. If the regulations of this Depart-

ment can be properly enforced, the appearance of Texas fever in this country outside of the affected areas will be very rare, and not a single case should occur among cattle after leaving our ports. I have therefore suggested amendments to the act establishing the Bureau of Animal Industry, which are now pending in Congress. If enacted, these will fully provide for the prevention of the spread of this and other communicable diseases of animals from State to State or from the United States to foreign countries. These amendments are essential to rendering the work of this Department effectual. If there is to be control of animal diseases at all, it must be so thorough as to prevent their spread, and thus remove foreign objections to our cattle and meats, give confidence to stock owners and shippers, and secure full protection to farmers.

INSPECTION OF PORK PRODUCTS.

It is with great gratification that I have assumed the duties imposed upon me by the passage of the act of August 30, 1890, in which provision is made for the inspection of salted pork and bacon. The unjust war waged upon our pork products by some of the European governments rendered this provision absolutely necessary as a preliminary step towards any action looking to a removal of the obstacles which now impede our export trade in these products. The absence of inspection on this side provoked an argument on the part of the representatives of foreign governments to which we were really not prepared to reply. It was that no inspection being held by ourselves while a rigid inspection was conducted by them of American pork products landed in their countries, they were in a position to know better than we ourselves the actual condition of these products. The present law will enable us to warrant the wholesomeness of our pork products under the seal of official inspection. Having then satisfactorily established the injustice of these foreign discriminations, we shall be in a position to demand their withdrawal, or at least to insist upon a retraction of all charges made on the ground of unwholesomeness or impurity. Armed with a certificate of inspection guaranteeing wholesomeness on the one hand, and with the retaliatory clause wisely interpolated in this law on the other, we shall, it seems to me, be in a position to provide powerful support to further diplomatic negotiations on behalf of the American hog products.

MEAT INSPECTION.

In my report of last year I urged the great desirability of a national inspection of cattle at the time of slaughter, and also an inspection of meats, which would enable this Department to guarantee that the animal products exported from this country were untainted by disease, and which would reveal at once the presence of any diseases affecting

our meat-producing animals. The call for such inspection was not because of any unusual prevalence of disease, since the animals of the United States are probably at present more exempt from such influences than those of any other nation, but because of the unfounded statements of disease which have been made the pretense for the restrictions and prohibitions which the governments of other countries have enforced against our animals and their products. None of these restrictions upon the sale of our meats have been removed, and it appears from the statements of shippers, confirmed in some cases by the reports of our consular agents, that there is a tendency to make them more stringent and irksome. It is sufficiently evident that any assistance which the Government can properly render to such trade, at a time when our home markets are overstocked as at present, should be freely accorded.

A bill providing for a general inspection law of this character was passed by the Senate September 18, 1890, and has been referred to the Committee on Commerce of the House of Representatives. This bill provides for all necessary regulations, and if passed will enable the Secretary of Agriculture to cause the inspection of animals and meats at slaughter, and to give a guaranty of their wholesomeness and freedom from taint of every kind. Such a law is urgently needed and should be enacted without delay.

QUARANTINE AND INSPECTION OF IMPORTED CATTLE.

Regulations for the quarantine of neat cattle from the countries not located on the American continent continue to be enforced. The period of quarantine—three months—is regarded as amply sufficient under the regulations to prevent the introduction of disease; and no additional restrictions will be imposed, notwithstanding the fact of the restrictions imposed by Great Britain on cattle from this country, and the further fact that pleuro-pneumonia is much more prevalent and widespread in Great Britain than it ever was here.

There has long been danger of the introduction of foot and mouth disease by the importation of sheep, swine, and other susceptible animals that have heretofore been allowed to land without either quarantine or inspection; indeed, this disease has several times been brought to this country by cattle from Great Britain, but it has fortunately been detected in time to prevent its dissemination here. Notwithstanding this fact, our sheep have been excluded from Great Britain for more than ten years, owing to the alleged existence of this disease in the United States, where it is never seen except in British cattle that were affected before landing.

I have concluded that the adoption by this Department of regulations for quarantine and inspection of all neat cattle, sheep, and other ruminants, and all swine imported into the United States under the authority given to me by the act of August 30, 1890, is necessary for

the full protection of our own live animals. Regulations have accordingly been perfected to carry this provision into effect, and it is believed that the result will be not only to fully protect our herds and flocks, but, in view of the assurances to that effect secured from the British authorities, that it will, moreover, result in the revocation by the British Government of the regulation excluding our sheep from Great Britain. This inspection and quarantine of all cattle, sheep, and swine imported into the country will add seriously to the work of this Department. During the twelve months ending June 30, 1890, cattle were imported to the number of 30,695; sheep to the number of 393,794; but the figures of the Bureau of Statistics of the Treasury Department fail to give the number of swine imported. Increased duties levied under the present law will no doubt greatly diminish the number of animals imported, although during the year just mentioned 3,935 head of cattle and 16,303 head of sheep were admitted duty free, on the ground that they were imported for breeding purposes.

In this connection I would point out that the average value of the 10,865 horses imported for breeding purposes during the year was but \$270 each; that the cattle imported for this purpose averaged but \$18.60, and the sheep but \$7.26, showing conclusively that by far the greater number of these animals were not of such a character as would improve our native stock, and that they could only be sold in competition with the animals produced by our own farmers. The new law provides "that no such animal shall be admitted free unless pure bred of a recognized breed, and duly registered in the book of record established for that breed." This wise provision will no doubt restrict the importation of animals free of duty to those which have special merit and which will prove beneficial to the agricultural interest.

THE SUGAR INDUSTRY.

Encouraging progress has been made within the past year in the development of an indigenous sugar industry. Under the impetus given by the investigations of this Department, improved processes of manufacture have been introduced on many of the more prominent plantations of Louisiana. In Florida large tracts of swamp land suitable for the cultivation of sugar cane have been reclaimed, and the culture and manufacture of cane have already been begun. In Nebraska a large beet-sugar factory, capable of using 300 tons of beets per day, has been erected with the best approved modern machinery, and is now in successful operation. The finest quality of granulated sugar is produced, which finds a ready local market, thus avoiding all expenses of transportation to and from a distant refinery.

A careful study of the soil and climatic conditions of the country favorable to the production of sugar beets has been made, and those localities in the United States best adapted for this purpose have been pointed out. This area includes a zone of territory extending from the

Atlantic to the Pacific, with a breadth of from 100 to 200 miles. It includes parts of the New England States, northern New York, northeastern Pennsylvania, northern Ohio, Indiana, Illinois, Wisconsin, southern Iowa, parts of Nebraska and the Dakotas, and large portions of the Rocky Mountain plateaus and of the Pacific slope. Within these areas it is confidently believed—and this belief has been verified by actual production of good beets—will be found an adequate acreage for the production of sugar on a large scale, and from beets as rich as can be grown in Europe. It is not an idle prophecy to speak of the production of a quantity of beet sugar in the near future sufficient to supply one-half or more of all the sugar consumed in the United States.

The investigations in sorghum culture have also been vigorously prosecuted, and the Department will soon be ready to offer to the sorghum growers of the country a few varieties of that plant which have been already developed to a high degree of excellence as sugar producers. At least one sugar factory in Kansas has been operated the present year with profit to the owners, with an output of three-quarters of a million pounds of sugar, demonstrating that with the best agriculture, the best soil and climate, and the best machinery, sorghum sugar may be made at a profit.

Under the fostering provisions of the new tariff bill, it is believed that the patient and laborious investigations of the Department will soon bear fruit and result in the production of our sugar at home. To further secure this end I have established three special experimental stations for the scientific study of the problems underlying the promotion of an indigenous sugar industry; one each for sugar cane, sorghum, and the sugar beet. Through these stations the farmers of the country will be taught the principles of the successful growth of the plants producing sugar, and the manufacturer the best methods of securing in marketable shape the products of the fields. With the administrative changes in the tariff law which I recommend, it is my sincere belief that the efforts of this Department to secure home sugar for home consumption will prove successful.

EFFECTS OF RECENT LEGISLATION.

It becomes my duty to call attention in this report to certain provisions under the tariff law which went into effect on the 6th instant, relating to the bounties on sugar from beets, sorghum, or sugar cane grown within the United States. Under Schedule E, paragraph 231, it is provided that the bounty on sugar, according to the polariscopic test, shall be paid "under such rules and regulations as the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, shall prescribe." Paragraph 232 provides that to the same officer, namely, the Commissioner of Internal Revenue, sugar-producers shall give due notice as to the place of production, equipment, and an estimate as to the amount of sugar they propose to produce in the cur-

rent or next ensuing year, and that they shall furthermore apply to the Commissioner of Internal Revenue for a license accompanied by a bond. Paragraph 233 provides that the Commissioner of Internal Revenue shall issue such license; paragraph 234, that no person not so provided with a license, etc., can receive bounty, and that the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, "shall from time to time make all needful rules and regulations for the manufacture of sugar from sorghum, beets, or sugar cane grown within the United States, or from maple sap produced within the United States, and shall, under the direction of the Secretary of the Treasury, exercise supervision and inspection of the manufacture thereof;" and so on throughout the entire Schedule E, relating to sugar, does the law provide that the entire regulation and control of sugar-making in the United States shall devolve upon a subordinate officer of the Secretary of the Treasury.

It seems impossible that the law should have been so drafted, save by an oversight. The entire work relating to the development of the sugar industry in the United States, from the chemical supervision of sugar-making established in Louisiana to the sorghum and beet-sugar experiments throughout the country, has been, from the first, part of the work of the Department of Agriculture, under the special supervision of its chief chemist. Under the direction of this officer there have been issued from time to time bulletins of the utmost importance to both growers and manufacturers. They are, indeed the only official sources of information relating to this important industry issued by the National Government; and during the last session of Congress a special appropriation was made by that body of \$50,000, to be expended through the Chemical Division of this Department under my direction, in promoting the cultivation of sugar-making plants and the manufacture of sugar. Moreover, the very essence of the supervision necessary with a view to an equitable award of bounties, namely, the testing of the sugar by the polariscope, is a strictly scientific operation, coming within the sphere of the Chemical Division, and one with which a considerable experience has made the chief and his assistants thoroughly familiar.

If it is really the intention of Congress to withdraw the "supervision and inspection" of the sugar industry from this Department, such intention should be formally expressed, and the efforts of this Department in relation to this important matter, involving the expenditure of much time, labor, and money, must be restricted to such lines of labor and investigation in connection with this industry as relate directly and exclusively to the sphere of the tiller of the soil. It is perhaps not generally understood that heretofore all the scientific supervision of work done in the various manufactories of sugar throughout the country has been exercised by the Chemical Division of this Department. Officers of this division have been detailed by me for this pur-

pose and a number of them are so engaged under my orders at the present time. It is unquestionably due to this Department to recognize the fact that whatever improvement has been made in methods of sugar manufacture, and whatever progress has been accomplished in the development of the sorghum and beet-sugar industry, has been due to the scientific investigations conducted under its auspices and the practical application of the results under the supervision of its officers.

Again, under free list, paragraph 482 provides that "any animal imported specially for breeding purposes shall be admitted free." It is further provided, in accordance with a suggestion of my own, that no such animals shall be admitted free unless pure bred, of a recognized breed, and duly registered in a book of record established for that breed. The provisions referred to are followed by the statement that "the Secretary of the Treasury may prescribe such additional regulations as may be required for the strict enforcement of this provision." Even before this Department was an executive department of the Government, its Bureau of Animal Industry had supervision of the importation of live animals into this country, and the head of the Department was held responsible in matters of quarantine of live animals, and for the supervision of the live-stock industry and the contagious diseases of animals. Recent legislation enlarges the powers of this Department, lodging in the hands of the Secretary of Agriculture "the control of all importations of animals, whether free or dutiable, imposing upon him the duty of inspecting the same, as he is charged also with the duty of regulating the interstate commerce in live animals and the proper inspection of all live animals exported.

Under those circumstances, the provision I have quoted, making it the duty of another officer to prescribe regulations for the enforcement of the provision admitting animals free under certain conditions, is incomprehensible to me. In section 20 of the said law it is provided—

That the operation of this section—

Prohibiting the importation of neat cattle and hides of neat cattle from any foreign country—

shall be suspended as to any foreign country or countries or any parts of such country or countries, whenever the Secretary of the Treasury shall officially determine and give public notice thereof, that such importation shall not tend to the introduction or spread of contagious or infectious diseases among the cattle of the United States, and the Secretary of the Treasury is hereby authorized and empowered, and it shall be his duty, to make all necessary orders and regulations.

Inasmuch as there is no officer of the National Government whose duty it is to have authentic information as to the existence of diseases among cattle in foreign countries and as to the contagious or infectious character of such diseases, and the probability of the introduction or spread thereof among the cattle of the United States, save only the Secretary of Agriculture, the provision in question which makes it the duty of another officer to declare officially as to such facts is, to say the least, an instance of glaring inconsistency in the law.

REORGANIZATION.

The act providing the necessary appropriations for carrying on the work of this Department became a law but a few months ago, and until this was done I was naturally much hampered in my efforts to carry out fully and thoroughly the measures indicated by me in my last report as assential to an efficient reorganization of the Department. During the past winter and spring I was obliged to do the best I could in this direction under these discouraging circumstances.

Since the 14th of July, when the appropriation act became a law, I have, with such appropriations as Congress saw fit to place at my disposal, pushed the work of reorganization with all possible energy. Under that act several new divisions were created, but as the work for these divisions had already been duly considered and carefully outlined, and as the persons designed to take charge of them were already in the employ of the Department, their reorganization was effected, I may say, immediately on the passage of the law.

A review of the work of the several divisions, which I now have the honor to lay before you, indicates the activity and energy with which the work of the Department has been pushed; and with a well-deserved tribute to the intelligence and good will exercised by all the members of my large force, in the performance of the duties assigned to them, I will now call your attention to the most salient features of the work of each division.

BUREAU OF ANIMAL INDUSTRY.

I have already alluded in this report to the exercise of the administrative powers of this Bureau and the generally satisfactory results which have followed, as well as to the additional powers which are in my opinion needed to make the work absolutely efficient.

INVESTIGATION OF DISEASE.

The scientific investigation of the communicable diseases has been carried on for the purpose of elucidating the many points in connection with the cause and nature of these maladies which must be understood before they can be economically prevented or eradicated. The diseases to which most attention has been given are hog cholera and Southern fever of cattle. With both, discoveries of great importance have been made, which are not only of value from a scientific point of view, but which promise important results in the way of prevention and treatment, and will accordingly be treated at length in the report of the Bureau of Animal Industry.

A thorough knowledge of animal plagues is becoming more and more necessary, both because of the great increase in the number of animals in the country and the multiplication of the transportation routes by which contagion may be carried, and also because of the recent legisla-

tion already mentioned looking to a Government guaranty that the animals shipped abroad and those from which our meat products are obtained have been unaffected by disease. The excellent results which have already been reached with pleuro-pneumonia and Texas fever demonstrate the possibility of controlling and even eradicating the most virulent diseases when our knowledge of them is sufficient to indicate the proper measures. That the most destructive diseases of swine and other animals will be ultimately controlled or eradicated is almost certain, and to hasten this result the scientific investigations should be maintained and made more comprehensive.

A short time ago, I regret to say, there was an announcement made under the authority of a State official, referring to an outbreak in a Western State, which was characterized as "foot-and-mouth disease." Issued under such auspices it was given extensive publication, but fortunately my attention was called to it at the start, and I immediately telegraphed the governor of the State in question, requesting him to do all that was in his power to repress the spread of a rumor which I felt sure must be groundless, and announcing my intention to have the matter immediately investigated by a competent authority. I at once dispatched one of our veterinary inspectors to the spot and received from him a report confirming my anticipations to the effect that it was not the disease known as "foot-and-mouth disease," and, furthermore, that it was not a contagious disease at all. Immediately on the receipt of this reassuring report, I cabled the facts to our consul-general's office in London, in order that he might make it public there, the unfortunate rumor to which I refer having already been reproduced in British journals.

I desire to emphasize here the danger of giving out statements of this kind without a thorough investigation. Immediate communication with this Department will always find me willing to co-operate in an investigation of this kind, and, until the exact facts are ascertained beyond a doubt, no statement alleging the existence of a dangerous contagious disease should be given to the public. It is no exaggeration to say that the losses to our cattle-growers from unfounded rumors of such diseases have been infinitely greater than the actual losses occasioned by the diseases themselves.

COLLECTION AND DISTRIBUTION OF INFORMATION.

The information obtained from year to year by the scientific investigation of diseases must necessarily form but a small portion of the existing knowledge on the subject of disease, and must be used in connection with what has been previously acquired in order to give satisfactory results. For this reason I have deemed it of great importance that reliable reports should be issued, treating systematically of the common diseases of animals with special reference to prevention and treatment. Taking these as a basis for comparison with the results of

investigations issued annually, the farmer will be enabled at all times to obtain full information in regard to any disease with which his stock may be affected.

The first report of this series on the Animal Parasites of Sheep has recently been issued, and a second report on the Diseases of the Horse is now in press. Other volumes are in preparation and will be issued as rapidly as possible. The favor with which the announcement of these publications has been received shows that they will supply a variety of useful knowledge which has been greatly needed by the agricultural community.

Various lines of investigation are being vigorously prosecuted with the design of showing the actual conditions, means of improvement, and future prospects of various branches of the animal industry. A full report on the Sheep Industry is in preparation, well advanced towards completion, and will probably form the first volume of this series. Reports on the American Trotter and the Thoroughbred Horse of the United States will be ready for the press at about the same time. This brief statement of the reports now nearly completed will serve as an indication of the character and scope of this section of the work of the Bureau of Animal Industry.

Last February I received an invitation to attend an interstate convention of cattlemen, to be held the following month at Fort Worth, Tex. Though unable to attend, I was impressed with the character and scope of the work indicated in the call for this meeting, and detailed a special agent of this Department to be present. I also sent a stenographer from this Department, with instructions to take a full report of the proceedings for my information. One of the subjects which was thoroughly discussed at the important convention in question, at which thirteen States were represented, was the urgent necessity to cattle-growers for more extended information on the subject of this cattle supply of the country, the condition of the cattle markets, and the relation of quality to price in the cattle marketed. I have given this subject considerable attention, have invited an exchange of views on the subject from prominent cattlemen, and have concluded that an earnest endeavor to secure information of the kind desired must be made by this Department through the Bureau of Animal Industry and its agents. It is merely carrying out the conviction, which I have frequently had occasion to express elsewhere, that the peculiar circumstances of our agricultural people and their lack of facilities such as are enjoyed by people whose occupations require them to live in cities, within easy access of all centers of information relating to their business, make it the imperative duty of this Department to supply this lack as far as possible, and I have determined that an earnest effort in this direction shall be made during the coming year.

DAIRY AND POULTRY INTEREST.

In my last report I announced my determination to establish in the Bureau of Animal Industry a special division devoted exclusively to the service of the dairy interest. The act of appropriation, with the changes made in the appropriation for the needs of this bureau, making it possible to carry this determination into effect, was passed so lately that the thorough organization and equipment of an important division of this character has not yet been possible. The present encouraging condition of the dairy interest, its vast extension throughout this country, and the general appreciation of the necessity for the successful conduct of the dairy business, of the strict application to the feeding of dairy cattle of the most scientific principles, and of the application to the business of perfect methods, make necessary the establishment in this Department of a division which shall be in these matters the natural leader. Such a division should moreover be able to extend material benefit to the dairy interests of this country by lending its aid to the extension of our export trade in dairy products and to the development of the manufacture at home of every dollar's worth of dairy products which we consume, an object which will be still further facilitated by the recent increase in the duty on cheese, a product which constitutes almost our entire dairy import.

Regarding the poultry interest, I am inclined for the present to place it in the special charge of the dairy division. Even though it may not be essential that this interest should be represented at present by a division, the magnitude of the interest requires that some one division be charged with its supervision. The poultry product of this country represents in the aggregate a vast sum; and the industry is one which exists, or should exist, on every farm in this country, and which, consequently, interests a larger number of the constituents of this Department than any other single industry. In this connection, I congratulate our poultry-raisers on the recent change in the law, which instead of admitting imported eggs free, now levies on them a duty of 5 cents per dozen. The large imports of eggs into this country in past years, which it seems have come not only from our neighbors in Canada, but even from across the ocean, amply justify the imposition of this duty.

DIVISION OF CHEMISTRY.

A review of the work of the Chemical Division during the past year shows that it has been carried on with diligence and success. New and commodious quarters have been acquired for the use of the division, and many mechanical facilities have been provided which it was impossible to find in the old quarters in the basement of the main building.

Work in connection with the adulteration of foods has been heartily sustained by Congress, and an increase in the appropriation has been

made therefor. This is a work which should have the sympathy of every legislator and the help of every honest man. The adulteration of human food is an evil whose proportions are growing, I am sorry to say, from year to year. It is an evil destined to undermine and destroy health, and its practice not only interferes with the sale of products honestly manufactured, but also casts discredit upon our goods in foreign countries, corrupts morals, and places a premium upon dishonesty. I hope to be enabled, through the Chemical Division, to analyze specimens of every product placed upon our market in competition with pure goods and products of the farm, and the coöperation of Congress in these efforts is earnestly solicited. Investigations during the past year have related particularly to the adulteration of tea, coffee, chocolate, and other table beverages. These results are now nearly ready for delivery to the printer.

These investigations show that the adulteration of such articles is not very extensive, and, except in the case of tea, is easily distinguishable. The most frequent one is the introduction of substances to give additional weight, such substances as will attach themselves readily to the leaves and yet not be easily distinguished by the eye. These substances are mostly of a harmless character, although some of them have been found to be deleterious. In the case of coffee the chief adulterations have been found in the ground coffees, the difficulty of adulterating the berry, whether roasted or unroasted, being so great as to almost exclude this kind of fraud. With the green berry, the chief adulteration seems to be in exposing it to a moist atmosphere that it may absorb moisture and thus increase in weight; but this is a species of fraud which is easily distinguished, since the simple drying of the berry and the estimation of the water contained therein is sufficient to determine whether or not it has been thus exposed.

Extensive investigations have also been made in regard to the adulteration of sugar, molasses, honey, and confections, and the publication of this work will speedily follow that of the work on the adulteration of table beverages.

A thorough study of the materials which prevent the crystallization of the sugar in sorghum juices has also been made, these substances have been identified and studied, and the best methods of removing them from the sorghum juices have been investigated.

Coupled with this work has been the continuation of the experimental station work for the development of varieties of sorghum which are as free as possible from these deleterious substances, and containing as high percentage of sucrose as can possibly be obtained by years of patient selection of seed and careful cultivation of the cane. Some remarkable results in cultivation of this kind are now on record.

In 1889 four varieties of cane were studied for thirty-five days, giving in that period an average of 14.15 per cent of sucrose in the juice, 1.15 per cent glucose, and having a purity coefficient of 77.5. The present

year seven varieties of cane, for the same length of time, showing an average of 14.48 per cent sucrose, .77 per cent glucose, with a purity coefficient of 76.40. The best varieties of cane this year showed, for fifty-one days, from August 25 to October 15, 15.48 per cent sucrose, .51 per cent glucose, with a purity coefficient of 78.36.

It is proposed to continue these culture experiments for the purpose of developing and introducing all varieties of sorghum cane which give any promise whatever of becoming useful. In all, the Department has experimented with about 800 varieties and subvarieties of cane. Many of these, on investigation, proved to be duplicates of others which had come to us under separate names. From this extensive list, after three years of careful investigation, all have been eliminated except ten or twelve distinct varieties which possess the essential qualifications of sugar-producing plants, viz., high sucrose content with a low content of other substances. Work will be continued with these selected varieties until their excellent qualities are rendered permanent by continued selection and by improvement due to careful cultivation. It is believed that the sorghum plant will then be able to compete successfully with the sugar cane and the sugar beet, but only in those localities where soil and climate are best suited for the production of the sorghum plant in its highest perfection.

The investigations so far completed show that the localities in which sorghum can flourish are confined to the semiarid region of the country, notably beginning in central southern Kansas and extending southward indefinitely. The investigations have also shown that sorghum of excellent quality can some seasons be produced in other parts of the country, but the uncertainty of suitable climatic conditions would seem to render it advisable to attempt the production of sorghum for sugar-making purposes only in the localities indicated.

Investigations by the Department in respect to the production of sugar from the sugar beet have also been of the most extensive nature. During the early spring 5,000 packages of sugar-beet seed of the most approved varieties were obtained from European growers and sent to all persons in the country who had applied for them. Arrangements were also made by which the beets, after maturity, could be sent to the Department for analysis. As a result of this arrangement beets have been received from about one thousand different localities in all parts of the country, and these have been analyzed in the laboratory. The results of the analysis are, for the most part extremely favorable, especially with those varieties which have come from the northern and central portions of the country. It is not uncommon to find beets containing 15 per cent of sugar, while in exceptional cases the percentage of sugar has risen as high as 20. We have also found many beets of a strictly typical character, combining a perfect shape with the proper weight and a high content of sugar. A typical sugar beet is conical in shape, smooth in its external contour, with a white, solid interior,

weighing about 1 pound, and having a content of sugar of about 14 per cent. Many samples of such beets have been received, showing that it is possible to produce in this country sugar beets of the highest type.

In Bulletin No. 27 are given the results of a careful study of the soil and climatic conditions of the country suitable to the production of sugar beets, and a map has been prepared showing a zone within which the most favorable results will probably ensue from the cultivation of the sugar beet. A large beet-sugar factory has been erected at Grand Island, Nebr., equipped with the most approved modern machinery, and this factory is now working sugar beets at the rate of 300 tons per day. There is every reason to believe that the encouragement which has been extended to the sugar-beet industry, by the investigations of the Department and by act of Congress, will result ere long in the establishment of many additional sugar factories in those portions of the country which the data obtained by the Department show to be best suited for the purpose. When it is considered that 250 beet-sugar factories of the size and capacity of those now in operation in California and Nebraska will be sufficient to make one-half of the total sugar consumed in the United States, it is not idle to expect that in the course of a few years a large proportion of the sugar consumed in the United States will be made therein from the sugar beet.

Further investigations of the Chemical Division have had relation to matters more specifically connected with the agricultural experiment stations and the best methods of analysis to be used therein. Investigations have been made of these methods in the laboratory, and they have been carefully compared with other methods, so that the best could be secured. In this work the coöperation of the agricultural chemists throughout the whole country has been enlisted in an organization known as the Association of Official Agricultural Chemists, whose annual conventions are held in Washington under the auspices of the Department of Agriculture and whose proceedings are published as bulletins of the Chemical Division. Bulletin No. 28 of this division, containing the proceedings of the association meeting held in August, is now ready for the press.

DIVISION OF STATISTICS.

The operations of the Statistical Division have been replete with activity in various directions. The necessity of statistics in the work of legislation is becoming more and more imperative, as attested by the demands upon this office during the extended session of the present Congress. The discussion of industrial and economic questions in the halls of legislation, in polemic discussion, in literature and journalism, makes constant demand upon the resources of the Statistical Bureau for the facts of production and distribution, prices of products, wages of labor, development of resources, and status of agriculture.

The year has been somewhat peculiar in its statistical record. An abnormally mild winter, characterized by verdure and vegetable growth until late in the season throughout all but the higher latitudes, was closed with a period of low temperature and frosts, which extended southward to the orange belt of Florida. The effect of conditions so extreme was injurious to all the winter grains and to all the orchard fruits, forecasting the reduction in area of winter wheat which followed, the unequal rate of yield for the breadth remaining, and the unexampled dearth of nearly all kinds of fruits. Even the Pacific coast had an exceptional experience, consistent in its proverbial unlikeness to Atlantic coast conditions, for while the country from the great mountains to the eastern seacoast was singularly mild and summer-like, the Pacific slope was cold and stormy, with heavy rainfall and an unusually late spring.

The spring weather of the East was unfavorable to early planting, being too cool and wet at many points. These conditions were favorable to the hay crop, which is very valuable everywhere, and in the South becoming vastly more important every year as the improvement of farm animals progresses in that region, promising to make stock-growing a very prominent rural industry of the cotton belt, which is in many respects peculiarly adapted to profitable extension of the various forms of animal industry.

The great arable crop of the country, corn, has had an unfavorable development. Starting in July with a condition expressed by the average of 93.1, which was less promising than the record of the previous year, but by no means discouraging, the effect of drought reduced the average in sixty days to 70.1; and on the 1st of October, when the crop matured, the record stood at 70.6, against 91.7, indicating a prospect for 23 per cent decrease in the rate of yield compared with that of last year. This foreshadows a reduction of something like half a billion bushels of corn. Still there is a fragment of last year's crop remaining, and there will be ample supplies for consumption of high-priced corn. The amount consumed depends much upon price, and the export demand is influenced far more by this consideration than the domestic consumption.

The winter wheat crop was reduced by spring frosts, and the spring wheat in its drier areas by drought, so that the average condition when harvested was expressed by 75.5, against 87.5 last year, indicating a yield materially less than that of 1889, upon a reduced area. The oat crop has met with a serious disaster, reducing its product more than 200,000,000 bushels. It has also been a year of partial failure of the potato crop. The reports of condition have been growing worse since July, and as the time of harvesting approached the yield was still further reduced by the prevalence of rot. The Southern crops are generally above an average in production. The cotton crop of last year was the largest ever grown and brings a good price, and the prospect is now

good for another large crop. The sugar product is also large, probably the largest grown for many years. Rice, tobacco, and vegetables have generally yielded well, and among the results is a high degree of prosperity in nearly all branches of Southern agriculture.

The despondency which was caused by the low prices of the beginning of the year has already been measurably dispelled by the advance in agricultural values, and good grounds exist for the belief that our farmers are entering upon a new era of profitable culture and general industrial prosperity.

DIVISION OF ENTOMOLOGY.

Though the year has not been marked by any very serious insect injury of a general character, the work of this division has been steady and unremitting. During the past few years the boll worm of cotton (*Heliothis armigera*) has been a source of more than usual damage to the cotton-planters, particularly in Texas, southern Arkansas, and parts of Mississippi and Louisiana, doing more harm than even the cotton worm (*Aletia xyliua*). The edition of the fourth report of the U. S. Entomological Commission, treating of the cotton worm and boll worm, is exhausted, and there has been a general demand from the States interested for a supplementary investigation of the pest. Congress appropriated a small sum for this purpose, and the investigation has been begun. Agents of the division have been stationed at College Station, Tex.; Pine Bluff, Ark.; Holly Springs, Miss.; and Shreveport, La; and the work of study and practical experiment has been apportioned so as to bring about the best results. The appropriation became available too late in the summer for efficient work, but the work this season will prepare the way for more thorough work next year, and if there is any possible way of giving our planters more effective and practical means of overcoming this enemy than those now at command, I have confidence that the way will be discovered.

During May there was a local outbreak of the army worm (*Leucania unipuncta*) in certain portions of the State of Maryland, and an agent of the division was sent to investigate it. There were some features about this outbreak that appeared abnormal, and the entomologist will consider it in his report in connection with another insect that is often mistaken for the army worm and which is much subject to an epidemic disease, a fact which acquires importance because of the possibility of artificially conveying this disease to the boll worm.

During July and August alarming rumors of the destructive appearance of the Rocky Mountain locust, or western grasshopper (*Melanoplus spretus*), were received from Idaho and Utah, and an agent of the division was sent to investigate them. He found that the locust in question was not the western migratory species, but a comparatively local form known as *Camnula pellucida*, information most reassuring to farmers in the Mississippi Valley. The means adapted to combating this

last-mentioned locust are identical with those which were found efficacious in the case of the first mentioned. The report of the Entomological Commission, containing the necessary instructions, is unfortunately out of print; but for the benefit of farmers situated in the district threatened by the present pest, I have directed the entomologist to prepare a summary of these instructions for distribution throughout the section of country subject to the present visitation.

Further experiments have been made with the use of hydrocyanic acid gas under tents as a remedy for the red scale. In my last report the statement was made that the cost of this remedy had been greatly reduced by experiments made by one of the California agents, and further experiments have developed means by which the process may be easily rendered more efficacious and the expense still further reduced.

The horn fly of cattle, which attracted so much attention last year, seems to have been much less abundant during 1890, and complaints from stockmen have been comparatively rare. Observations confirmatory of the results recorded in my last report have been made, and late fall and winter observations show that this insect hibernates in the preparatory state in the ground.

The question of the damage of the grape by phylloxera in California has been taken up, and certain vine-growing regions of the State have been visited by an agent, who is making tests and observations.

The division has been appealed to in reference to the possible danger of the importation of the destructive Florida scale insect into California, a matter which has attracted a great deal of attention the past season in the latter State. It seems that frequent accidental importations of these scales, particularly of the purple scale, the long scale, and the chaff scale, have been made; but in no case have the insects become destructive. It is therefore argued by many that the climate of the Pacific coast is not favorable to their increase, while others hold opposite views and are much alarmed. The entomologist is of the opinion that, while there are some grounds for the former belief, we can not exercise too much care in preventing the carrying of these destructive scale insects from one section to another. I have therefore been particularly careful to have the plants received from foreign countries and to be shipped to the different States carefully disinfected before such shipment, as I am very anxious that the Department shall not be the means of further disseminating such noxious species. I earnestly recommend that similar precautions be taken by all nurserymen and horticulturists shipping plants to other States.

In view of the success that has attended the importation of the Australian ladybird to prey upon the fluted scale in California, public attention has been specially drawn to this manner of destroying injurious insects through the instrumentality of their natural enemies, but success in any instance is not likely to follow without the most complete,

thorough, and intelligent direction. The entomologist, fully realizing the importance of this question, has made various efforts during the year, so far as they can be made with the assistance of foreign correspondents equally interested in the subject, to import desired species, and to reciprocate by sending others abroad.

The increased appropriation to this division will justify renewed attention to the subject of bee culture, and plans are being formed to carry on whatever investigations will tend to advance this important industry. The investigations already made under direction of the entomologist had for their object the control of the fertilization of the queen, whereby bee-keepers would be able to improve the disposition and the honey-producing qualities of their bees by selection, in the same manner in which the stock-breeder and the fruit-grower have for so many years so successfully improved our domestic products. There is reason to believe that this can be accomplished with reference to the bee; but there are many other ways in which the Department can help the bee-keeper in investigations on a scale which neither individuals nor associations can afford to pursue. This is especially true in reference to the study and introduction of bee plants from sections of the country or other parts of the world where they are valuable into sections where they are not yet known. This applies also to the introduction of bees known to have desirable qualities; as, for instance, the *Apis dorsata* of Ceylon.

Many other insects of less importance have been carefully studied and figured, notably the rose chafer, concerning which a complete article has been published in the periodical bulletin of the division. The publications of the division have occupied more of the time of the office force than usual. The issue of *Insect Life*, the periodical bulletin, has been continued, and most encouraging comments concerning the usefulness of this publication are constantly received.

DIVISION OF MICROSCOPY.

The following is a brief abstract of the work upon which the Division of Microscopy is engaged for the current year: Original investigations in the interest of pure-food stuffs, including medicinal and food oils and condiments. In food stuffs the skillful use of the microscope is constantly demanded to meet the new methods and combinations practiced in the adulteration of butters, lards, and branded substitutes for butter and lard, as well as in the examination of the various other food products. A microscopical examination of certain lard compounds in relation to the lard bill of the Fifty-first Congress was made by this division for, and at the request of, the House Committee on Agriculture.

The study of economic textile fibers is also a part of the work of the year. The various structural characteristics of textile fibers, which represent their felting properties, in respect to which they greatly differ, will be illustrated.

A further and more comprehensive illustration of our native edible mushrooms, as well as of poisonous varieties, and of those which may be classed as doubtful, is in progress as part of the year's work.

DIVISION OF ECONOMIC ORNITHOLOGY AND MAMMALOLOGY.

During the past year the work of this division has been continued in the two lines of research mentioned in previous reports.

(1) The work on geographic distribution of species has received as much attention as the means at the command of the division would permit, and considerable progress has been made both in the study of the faunal areas of the country and in mapping the distribution of species.

A report of the work done in Arizona during the summer of 1889 has been published as *North American Fauna*, No. 3. It gives in detail the results of a biological survey of about 5,000 square miles in the northern part of the Territory, and is accompanied by accurate maps of the forests of the region. The practical scientific value of such a survey is self-evident, and it is hoped that the division may be enabled to extend this work to other and larger areas.

The study and mapping of faunal areas—those fitted by nature for the existence of peculiar associations of animals and plants and consequently for the production of certain crops—have progressed far enough to warrant the issue of a provisional map. Such a map, showing by different colors the principal life areas of North America, has been prepared and accompanies *North American Fauna*, No. 3.

In order to obtain more complete data respecting the breeding range of various species of birds, a special schedule was prepared and sent out early in the year, and already reports have been received in reply from nearly four hundred localities. These reports contain much valuable information, which is being tabulated and mapped as rapidly as possible.

The most important field work accomplished during the present year has been that done in the Salmon River Mountains in Idaho, under the personal supervision of Dr. Merriam, chief of the division, assisted by Mr. Vernon Bailey and Mr. Basil H. Dutcher, field agents of the division. This work, which is still in progress, has already brought to light many facts of economic and scientific value concerning this almost unknown region and has resulted in the discovery of several species new to science. Important work has also been carried on in the arid regions of the West, especially in Texas, Wyoming, Utah, and Washington; in the latter State an effort is being made to determine the northern limits of the "basin region."

(2) The economic work of the division, that devoted to the study of species directly injurious or beneficial to agriculture, has been mainly confined to investigations connected with the preparation of four distinct bulletins, namely, (a) an illustrated bulletin on hawks and owls,

now almost complete, which, it is hoped, will be ready for distribution soon; (b) a bulletin on the gophers of the Mississippi Valley, on which work has been continued during the year and much valuable information secured concerning the distribution and ravages of the several species; (c) a bulletin on the common crow, already far advanced, and (d) a bulletin on crow blackbirds, now well under way. In connection with the work on these bulletins more than eight hundred stomachs have been examined during the past year, while about two hundred more, mainly those of bobolinks and meadow larks, have been examined in response to special requests for information as to the food of these birds.

A little time has been devoted to the collection of published notes by other workers in this little known field, but the records are so few and so widely scattered that as yet only a beginning has been possible.

In connection with the stomach examinations the utility of the reference collection of seeds has been demonstrated almost daily, and although very considerable additions have been made during the year, this collection is still lamentably incomplete. The facilities for the determination of stomach contents have been materially increased and a competent biological clerk has been added to the force of the division.

More than 4,000 specimens have been sent in for identification by field agents and others, and a large and increasing correspondence has been conducted since January 1, 1890.

DIVISION OF FORESTRY.

Although there is evidence of a growing appreciation throughout the country of the importance of the interests which this division is designed to serve, there is still need that the scope and character of its work be explained and illustrated. The day when forest planting and the application of scientific principles to the management of our natural forest areas will be generally recognized as a necessity is certainly approaching. While our forest resources are still immense, signs of approaching exhaustion in certain directions are already apparent. Carriage timbers especially are becoming scarce. The scarcity of walnut has long been known, and trade papers are beginning to discuss the difficulty with which first-class white-pine stock can be secured and to note the abundance of culls in the market, a sign that this staple resource, often represented as inexhaustible, must have been considerably reduced.

Without, therefore, entertaining alarming apprehensions of timber famine in the near future, it is a wise policy to keep watch over our forest resources, to show how unnecessary waste can be avoided and the means of economy developed, and to teach those principles by the application of which the natural forests may be so utilized as to recuperate and reforest themselves with valuable timbers, and also to teach

how to create new forests artificially. It is the duty of this division, furthermore, to point out the consequences upon water and soil conditions of imprudent and undue deforestation. Although better endowed than formerly by the appropriations for the current year, the Division of Forestry is not yet equipped for field work, or, indeed, for any but scientific investigations that can be carried on in the office or laboratory, or by studies in the natural forests.

The two lines of investigation which will continue to be foremost, and for which the present appropriations insure more effective prosecution than formerly, relate to the life history of our important timber trees and to studies into the relations of the quality of timber to the conditions of its growth. Monographs dealing with the former subject are in hand for publication during the coming winter. The latter investigations will require careful selection of study material, laborious laboratory work, and a large number of tests, and promise to afford results of marked interest to the forester and of great practical value to the engineer, the builder, and, indeed, to every worker in wood.

During the year there has been published in the interest of forest conservation a very exhaustive report on the experiences of the world in regard to metal ties. This publication is full in mechanical detail, and will serve, it is hoped, to stimulate our railroad managers to give further trial to this substitute for wood material, since it is said to be of improved efficiency and ultimately most economical. Whenever it has been practicable, the chief of the division has been detailed to attend the various forestry conventions and other meetings where it has been believed that interest in forestry matters might be stimulated or advanced.

To accompany distribution of tree seeds, which, to satisfy the demands of the law, is made in small quantities proportionate to the appropriation, a circular giving detailed instructions for handling the seeds was prepared and distributed. It is thought best to restrict the distribution of plant material, as far as possible, to such kinds as are not readily obtainable, or to such as for some other reason are not likely to be tried by the would-be planter, and to engage the experiment stations in the trial of new species rather than leave this work to inexperienced hands. Excepting an importation of Austrian osier rods, which were sent to the experiment stations, only native seeds have been distributed.

RAINFALL EXPERIMENTS.

An amendment to the act of appropriation for this Department was adopted at the last session of Congress placing at my disposal the sum of \$2,000 "for experiments in the production of rainfall," it being understood that such experiments were for the purpose of ascertaining whether such a result could be attained by the use of explosives. The difficult and problematical nature of these experiments, and the neces-

sity of undertaking them only under the direction of a person possessing thorough qualifications for conducting the work, has made it thus far impracticable for me to give the matter proper attention. The experiments will, it is expected, soon be inaugurated.

DIVISION ON BOTANY.

As stated last year, two distinct lines of research are carried on by this division—the scientific and the practical. Under the first, gratifying progress has been made in the collecting, classifying, and mounting of plants growing in all parts of the United States, as well as of others secured by exchange or otherwise from foreign countries.

The herbarium of the Department of Agriculture has become of national importance and of great money value, and some of its parts could never be duplicated if lost or destroyed. Its location in the Department building, which is not fireproof, is a source of great anxiety, not only to those who have charge of it, but to the scientific world. The American Association for the Advancement of Science at its last meeting passed a strong resolution urging the Department of Agriculture to furnish fireproof quarters for it.

The Department has lately commenced the publication, in a special series, of the information which it is enabled to gather from study and comparison in the herbarium. This information is embodied chiefly in scientific papers, designed more especially for botanists, and intended to supplement the more practical work of the bulletins. The special series is not a periodical, but numbers are issued as often as sufficient matter accumulates. Three numbers have already been distributed. Nos. 1 and 3 relate to the flora of Southern and Lower California and No. 2 is a catalogue of Texas plants, which is preliminary to a manual of the flora of that State soon to be published by this Department.

In the collection special note is made of all economic plants. So far as concerns forage plants, bulletins are issued, illustrated by plates, describing their characteristics and value for forage purposes and setting forth the soils and climate to which they are adapted. During the year two such have been issued, one a new, revised edition of the "Agricultural Grasses of the United States," the other, Bulletin No. 12, entitled "Grasses of the Southwest." Both bulletins have received the highest commendation from farmers and from botanists. They exemplify in the best sense the value of scientific work applied to practical uses.

The experiments undertaken by the Division of Botany with a view to increase the grass production of the arid lands of the West have thus far demonstrated that a decided improvement in this matter is practicable; that the introduction of certain methods of cultivation and of certain forage plants not before used renders possible great advance in the grazing industry of those regions. Congress at the last session, appreciating the importance of the experiments, increased the

appropriation therefor, to enable this Department to arrange with all the western stations for coöperative experiments under our supervision. The chief of the division has about completed an extended tour of the West and South, made for the purpose of arranging the plan of the work and more carefully studying the conditions of soil and climate. The operations at the Government grass station, at Garden City, Kans., have been very satisfactory, and for that locality the results have been fully equal to our expectation.

DIVISION OF VEGETABLE PATHOLOGY.

Since my last report Congress, in accordance with my recommendation, has made the section of vegetable pathology a division, and it is now thoroughly organized and equipped with an efficient corps of workers in both the field and the laboratory.

A special effort has been put forth during the past year to make the field work as thoroughly practicable as possible, and with this end in view the chief and several of his assistants have spent considerable time making experiments which I believe to be of great practical value. To show the importance of this work I will cite the case of one series of experiments personally conducted by the chief, the results of which are based on very careful records. The remedies used were those whose efficacy has been established by this division, and the object of treatment was a large nursery whose proprietor had offered his entire stock to the Department for experiment. This work extended over two years. The expense involved was a little over \$125 and the amount saved was \$5,000.

This division was the first agency in this country to introduce the use of fungicides for grape diseases, and it is estimated as a result of its work that nearly five thousand grape-growers in all parts of the country treated their vineyards for mildew and black rot in 1890, and the amount of fruit saved in this way will vary from 50 to 90 per cent of the crop.

In addition to the foregoing, experiments in the treatment of pear, apple, quince, and numerous small fruits have been conducted in New Jersey, Maryland, Virginia, Wisconsin, and Missouri. The diseases of other crops, such as cotton, tomatoes, potatoes, etc., have been under treatment in numerous widely separated localities, each of which was selected as being particularly adapted to the work in hand.

The laboratory work has been pushed forward with vigor, the principal subjects under investigation being peach yellows, the California grape disease, pear blight, cotton diseases, a bacterial disease of oats, and the so-called "rots" of the sweet potato.

The laboratory investigations of the California grape disease have been mainly in the line of bacteriological study of diseased parts of the vine, supplemented by inoculation experiments, with a view to determining the contagious and noncontagious nature of the malady.

Numerous facts bearing on this subject have been accumulated, and these will be shortly embodied, together with a result of the field observations and experiments, in a report soon to be published. In May of this year a special agent engaged in this work asked and was granted leave of absence without pay for six months, in order that he might visit France, Spain, Italy, and Northern Africa in search of information that will aid him in his work.

For many years the vineyards of these countries have been ravaged by a disease which, according to the published account, is very similar to the one in California. It was claimed that within the past two years the disease had almost entirely disappeared from certain portions of Italy, and it was principally to get some definite information in regard to this matter that the agent desired to personally inspect the European vineyards. It is hoped that his investigations will enable him to throw some light on the best means of combating the California trouble, which has already devastated thousands of flourishing vineyards, causing losses almost beyond calculation.

The peach-yellows work is being prosecuted with vigor along practically the same line followed last year. Some important results bearing on the treatment of this disease have been obtained, but as yet they are not sufficiently conclusive to warrant their publication.

The publications and correspondence of the division have assumed such proportions that to give them the attention they deserve requires about one-third of the time of the regular office force. Two special bulletins and four numbers of the *Journal of Mycology* have been issued since my last report, and the fact that the editions of these are now entirely exhausted is, I believe, a sufficient guaranty of the interest in the work.

DIVISION OF POMOLOGY.

The development of the fruit industry throughout the country and in parts of the country where not long since it was thought no fruits could be grown, has been steady and encouraging. It must not be forgotten in estimating the value of pomological work in the United States that we Americans pay to foreign fruit-growers more than \$20,000,000 per annum for fruits and nuts which we import. I am convinced that one of the ultimate rewards of scientific pomology will be to see very nearly the whole of this vast sum turned into the pockets of American fruit-growers, so wide is the range of climatic variation in different sections of our vast country. To accomplish this result necessitates a special study of and experiment in the study of fruit-culture; and it is my hope that the Pomological Division of this Department will contribute an important share to this great work.

Special agents have been appointed to obtain information regarding fruit culture in their respective localities and to report to the pomologist as to their wants and resources. A system of reciprocity between

the division and the various national, State, and local societies of a pomological nature has been inaugurated. The identification of fruits sent from all parts of this country is becoming more and more useful as a part of the work of this division, and during the past year there has been a very great increase in the number of samples sent for this purpose. It is evident that this portion of the work of this division is highly appreciated by the fruit-growers of the country.

I am glad to be able to state that in pursuance of the work of this division, which involves the effort to introduce foreign and untried varieties and species of fruits into this country from abroad, a successful importation was made during the year of the date palm from Egypt and Algeria. Sixty-three trees, representing eleven of the choicest varieties, were received and were found on arrival to be without exception in good condition. This is the first instance of the successful introduction of rooted suckers of any variety of the date upon this continent, a notable event in the pomological history of the country. Their transportation has frequently been attempted, but the plants have never survived the voyage. There are good grounds for anticipating their successful introduction into the arid regions along our extreme southwestern border.

The division has in course of preparation a special report upon nut-culture, and it will be based upon the practical experience of those who have already given this subject attention, and such information and advice will be given as may prove of benefit to those who desire to engage in it. Many choice varieties of wild nuts, especially of the chestnut and pecan, have already been discovered in the course of the investigation of the subject, and these will be obtained and placed in the hands of careful experimenters. Choice kinds of the filbert will also be brought from England and placed where it is likely they will succeed in this country.

One of the important features of the work of this division is an investigation of our wild fruits. This investigation should be more thorough than the means at hand enable me to make it, but no field of pomology is more promising of good results than this, and I trust that by enlisting in the work the cordial coöperation of the various experiment stations throughout the country much good may be accomplished, even with the limited means on hand.

SILK SECTION.

I stated in my last report that, in regard to silk-culture, the real question to be determined as to the possibility of establishing this industry in the United States is that which concerns the reeling of silk, the conversion of the cocoons into a marketable thread.

While I have looked for assistance in the solution of this problem to the improvement of machinery for reeling silk, I have nevertheless become quite convinced that, even with such machinery perfected, it

would be necessary for manufacturers to have some encouragement, either in the shape of a duty on imported raw silk or a bounty for such as might be produced in the United States. The importance of this subject and the desirability of establishing such an industry are beyond dispute, and, as though to strengthen the claim on behalf of home-grown silk, we find a great increase, nearly 25 per cent, in the imports of unmanufactured silk during the last fiscal year over the preceding one, the imports of this product for the fiscal year ending June 30, 1889, being in value \$19,333,229, and for the fiscal year ending June 30, 1890, \$24,331,867. Under those circumstances I confess that it would be a source of great regret to me to see the abandonment of all efforts looking to the establishment of silk-raising in the United States, but I can not but reiterate my conviction that to all the improvement in mechanical devices which American ingenuity can bring about must be added the benefit of legislative encouragement. Should some bill embodying this idea become a law during the coming winter, it would afford me great pleasure to be the instrument for executing it and creating for this industry a brighter outlook than at present exists.

TEXTILE FIBER INDUSTRIES.

The fiber investigations commenced in 1889 have been steadily pursued with encouraging results. Much valuable information has been collected showing the present status of different branches of the fiber industry in this country and in Europe, a portion of which has already been given to the public in Bulletin No. 1 of the fiber series. Since the beginning of the year nearly 400 specimens of fibers and fiber plants have been received, many of them from farmers and others seeking information regarding possible new fiber interests, or exhibiting to the Department results in cultivation, preparation, or manufacture of known fibers.

Among the examples of American flax received by the Department are several fine samples grown in Wisconsin, Minnesota, Iowa, and on the Pacific coast, one of which, from the first-named State, is declared by a leading manufacturer to be "good enough for even fine linens." A fine sample was also received from Texas. A beautiful example of linen thread, grass-bleached in New Jersey, demonstrates that this branch of the linen industry can be carried on in the United States as successfully as in Europe; while the entire linen series proves conclusively that even fine flax, in any quantity, can be produced in this country with skill and careful culture. The new tariff law raises the duty on dressed line from 2 cents to 3 cents per pound, and gives to the manufacturer of crash and the coarser linens an immediate additional protection of 15 per cent ad valorem. This makes an American flax industry possible. The early establishment of large linen factories in this country will assure a market for American-grown flax, and the duty of 3 cents per pound on the dressed line, it is thought, will enable the American grower to produce flax fiber with profit to himself.

As flax culture is a new and untried thing with many farmers, the Department will render all aid in its power toward reëstablishing the cultural side of the linen industry. Already there is great interest in new machinery and processes for cleaning flax, and some of these give promise of good results.

Hemp culture has been largely extended in States north of the Ohio River, and a perceptible increase in the employment of native hemp in binding twine (in preference to the higher-priced imported sisal and manila hems) has been noted. Considerable areas of sisal hemp are growing in Florida, and it is thought that with a little encouragement at the outset sisal hemp might readily be produced within our borders. New Zealand flax is growing in California, from which strong fiber has been experimentally produced. Seeds of this plant, and of the manila hemp plant, have recently been imported and distributed for experiment in southern localities.

Several indigenous plants producing bast fiber, growing throughout the South, are under investigation and will be reported upon when the investigations are completed.

In regard to the ramie industry the chief progress of the year has been in the direction of manufacture rather than that of decorticating machinery, though the interest in this fiber continues.

ARTESIAN WELLS INVESTIGATION.

By a provision in the urgent deficiency act, approved April 4, 1890, Congress appropriated \$20,000, and directed the Department to investigate the proper location for artesian wells and their use in irrigation in the semi-arid region lying between the ninety-seventh degree of west longitude from Greenwich and the eastern foothills of the Rocky Mountains. The area includes the States of North and South Dakota, portions of Montana, Wyoming, Colorado, New Mexico, and Texas lying east of the Rockies and the lower Rio Grande River, with those portions of Nebraska, Kansas, Oklahoma, and the Public Land Strip that are west of the ninety-seventh degree. The appropriation was made available the 15th of April, and by the 20th of that month organization was perfected and field work begun by a large and competent staff of division geologists and field agents working under capable chiefs.

The field and official work was heavy, as the law required a report to be made as early as possible after the 1st of July. The supervising engineer and chief geologist made an intelligent though rapid reconnaissance of the whole field, each of them traveling in doing so about 12,000 miles. The entire field force covered at least 70,000 miles of travel during their work. A report of operations was made on the 22d of August to Congress. The reports of the special agent in charge, of the supervising engineer, the chief geologist, and of the several division geologists and field agents are accompanied by valuable maps,

diagrams, plans, and illustrations drawn from photographs taken for this investigation. Besides the three principal reports there are four from division geologists, covering the Dakotas, Western Nebraska and Kansas, eastern Colorado, and southwestern Texas. These contain a mass of valuable data, locating and describing over 1,300 artesian, a large number of bored or gang wells, and several hundred springs, besides presenting important evidence as to the existence of other earth waters in quantities sufficient for economic application to agriculture when the same can be restored to and distributed over the earth's surface. The reports presented, under the provision of the law of April 4, 1890, are confined directly to the location and availability of artesian waters, all other references and data being incidental. It was found necessary to make for the use of the investigating staff a definition of "artesian water." This was done in the following terms:

To include all the subterranean waters, which, on being reached or opened from above, are found to flow to a level higher than the point of contact, and from some permanent and general source rather than from a local and temporary one. All bored wells in which the water rises and all natural waters, such as springs, rising from below, are included in this definition as artesian in character. These supplies may be divided into positive and negative, the first to include wells the waters whereof flow above the surface of the earth, the second to embrace waters rising with force, but not flowing above.

Taking into consideration the time employed, this series of reports must prove to be of decided economic value. They form a positive contribution to the science of hydrogeology, or the phenomena of earth waters, besides illustrating the possibility of an extensive agricultural utilization of such valuable supplies. A supplementary report relating to earth waters, other than artesian, as defined by his investigation, is now being prepared, under a resolution adopted in June last by the Senate of the United States. This report will deal largely with the evidences of water underlying the river valleys and uplands of the Great Plains region, as under-sheet or underflow, and by percolation, seepage, and drainage.

The brief preliminary reports made to Congress of the artesian wells investigation resulted in the passage of the following provision of the general deficiency act, approved September 30, 1890.

IRRIGATION INVESTIGATION.—To enable the Secretary of Agriculture to continue to completion his investigations for the purpose of determining the extent and availability for irrigation of the underflow and artesian waters within the region between the ninety-seventh degree of longitude and the eastern foothills of the Rocky Mountains, and to collect and publish information as to the best methods of cultivating the soil by irrigation, \$40,000: *Provided*, That no part of said sum shall be expended unless the entire investigation, collection, and publication contemplated herein, including the report thereon, can be fully and finally completed and finished before July 1, 1891, without any additional expense, cost, or charge being incurred.

The extraordinary nature of the above proviso made the formulation of plans for carrying out the investigations enjoined upon me under the act a matter of very serious difficulty. Indeed, a too literal adherence to the language of the act, embarrassed as it is with this provision,

would make it well-nigh impossible to undertake the work at all. Assuming, however, after due consideration, that the intention of Congress was that these investigations should be continued, I at once proceeded to organize an irrigation inquiry, and to prepare to carry on the work of artesian and underflow investigation as far along toward completion as was possible by the exercise of the utmost diligence within the period provided. At the same time I felt called upon to instruct the gentlemen in charge that all reports must be completed and handed in on or before the 30th of April, 1891. The date at which the act was approved and the early period at which I am obliged to call in the reports necessarily curtail the time available for field service to a few weeks of field activity, and hence curtail the usefulness of this investigation.

Edwin S. Nettleton has been appointed as chief engineer of this department and Robert Hay as chief geologist. The engineer at once entered on field work in the Dakotas. He is also preparing plans for the prospective utilization in irrigation of the waters of certain artesian wells. These plans are to be the basis for constructing reservoirs, distributory ditches, etc., the cost of which is to be borne by land-owners willing to meet the burden of such experiments.

It has been represented to me that underflow waters can be made available for purposes of irrigation by means of pumping at a less expense than that entailed by the building and maintenance of extensive reservoirs, dams, and ditches. Inasmuch, moreover, as the former plan, should it be found equally effective and economical, would place this matter of supply in the hands of the individual land-owner, a feature which is in itself favorable to this plan, I have directed the chief engineer to make a special investigation with a view to supplying reliable information on this point, with such details in regard to the relative cost of the work as will substantiate or controvert the representations in question.

In October Prof. Robert Hay proceeded to northwestern Nebraska, where, being soon joined by the chief engineer, a series of observations were at once made, both investigations moving southward as rapidly as possible, examining western Nebraska and Kansas, the adjacent section of Colorado, and the important drainage basins of the Canadian and Pecos rivers within eastern New Mexico. Levels are being run across this mid-section of the Great Plains, and investigation of the underlying strata, their position and relations to the wells, springs, and other evidences of earth waters, are in progress, the results of which I hope to submit to Congress at an early day. It is hoped by these levels and field investigations to quite definitely locate the sources, nature, and extent of the subterranean water supplies. Similar field work will be continued in the Southwest throughout the winter, and at the earliest date that the season will permit active labors will be resumed along the whole line.

The Irrigation Inquiry Office, under the direction of Special Agent R. J. Hinton, is preparing by my orders a concise but comprehensive progress report on irrigation, its development, and the cultivation of the soil thereby. Monographs and reports will also be made through this office by specialists and experts, who will examine and report on such divisions of the arid region as they are most familiar with. This series of papers will include, among others, monographs on irrigation and water supplies in the mid-plains section, Colorado and Wyoming; the basin division, including northern Arizona, Utah, and Nevada; the Northwest, or Montana and Idaho, with Oregon and Washington east of the Cascade range; also California and southern Arizona, and the Valley of the Rio Grande.

AGRICULTURAL EXPERIMENT STATIONS AND OFFICE OF EXPERIMENT STATIONS.

The Office of Experiment Stations serves to connect the agricultural experiment stations in the several States and Territories with each other and with this Department, to bring to them the fruits of accumulated experience, to indicate lines of inquiry, to assist them in coöperative effort and in research, to coördinate their work, and to collate and publish the results.

During the past year the work of the office has included correspondence; visiting stations; attendance on farmers' meetings and conventions of college and station officers; the collecting and indexing of station and other literature; the collection of statistics, and the promotion of coöperation among the stations. A most important part of its business has been the preparation of publications, including a record or the current publications of the stations and of this Department; the proceedings of the Convention of the Association of American Agricultural Colleges and Experiment Stations; organization lists of the stations and colleges; circulars and letters of inquiry and information on topics relating to station work; and, finally Farmers' Bulletins.

The correspondence of the office is large and has doubled in the past year. It relates not only to the scientific, administrative, and general interests of the stations, but also to numerous and varied problems in agricultural science and practice, and extends to all parts of the world.

The increase in the amount and improvement in the quality of the work of the stations and the establishment of new ones have caused corresponding increase in their publications. The editorial work of the office is consequently enlarged, and the Experiment Station Record for 1890-91 will include twelve numbers instead of six, as in the previous volume. The Record, with its index, makes it easy to ascertain what the stations are doing in any given line of investigation, what are the main results, and where the published details are to be found. It will thus be increasingly valuable. Further provision for collating and disseminating information is made in the Digest of Station Reports and other technical publications of the office.

Each station distributes its own publications freely in its own State, but can send very few outside, although the results reported would often be equally useful in other States. To provide for the general distribution of such information to the farmers of the whole country a series of inexpensive popular bulletins has been planned. Of the first of these an edition of 50,000 was speedily exhausted, and its statements were widely quoted by the agricultural press. A second bulletin illustrated the results of inquiries pertaining to topics of practical interest. An edition of 150,000 was issued, of which 75,000 were distributed through members of Congress. The nature of these publications led to the name "Farmers' Bulletins." The work and connections of the office are such as to bring to its attention a great amount of information of the highest value to the farmer, and I earnestly hope that the printing fund of the Department may be so enlarged as to enable these popular publications to appear more frequently and in larger numbers than heretofore.

One direction in which the sphere of the office should be enlarged is the collating of the fruits of agricultural inquiry in Europe, where during the past forty years numerous experiment stations and kindred institutions have been studying the laws that underlie the right practice of farming, with results that are constantly increasing in volume and value. Our station workers need this information to enable them to avoid going over old ground and making old mistakes and to suggest to them the most advantageous methods and lines of research. The Department needs it for its own investigations and to enable it to give to the stations the advice and assistance which they desire. So urgent is the need that this work must be undertaken at once, but that in order that it may be carried on effectively and with sufficient thoroughness, an addition to the appropriation for the office is imperatively demanded. Well done, this work would save years of experimental investigations in this country; without it, the loss of labor, of money, and of needed information will be great.

Plans have been suggested and are under consideration for coöperative investigations on the soils of the country; fertilizers; sugar-beet culture; dairying; foods and feeding stuffs; the improvement of native grasses, forage plants, and wild fruits, and the introduction and acclimatization of new economic plants, the successful culture of which will substitute home-grown for foreign products. For the most advantageous carrying out of these plans there is need of more frequent visiting of the stations by the representatives of this Department, especially of this branch of it, and of the occasional calling to Washington of the directors and leading workers of the stations for consultation.

A review of the work and condition of the experiment station enterprise in the United States is on the whole decidedly encouraging. During the past year eight new stations have been established, viz,

in north and southeast Alabama, Arizona, south California, New Mexico, North Dakota, Utah, and Washington. Experiment stations are now in operation under the act of Congress approved March 2, 1887, in all the States and Territories except Montana, Washington, Idaho, Wyoming, and Oklahoma. In several States the United States grant is divided so that 52 stations in 43 States and Territories are receiving money from the United States Treasury. In several States, branch or substations have been established. If these be included the number of stations is 70.

These stations, with this office, expend in all about \$785,000 per annum, of which \$660,000 is appropriated from the National Treasury. They employ over 400 persons in the work of inquiry and are conducting a large amount of research in the laboratory and greenhouse, and of practical experimenting in the field, the orchard, the stable, and the dairy. During the past year the stations have published about 300 reports and bulletins, aggregating about 10,000 printed pages. At a low estimate, 3,000 copies of each of these publications have been distributed, making a total of 30,000,000 pages, containing information on agricultural topics, directly disseminated among the people by the stations during one year, and thousands of newspapers and other periodicals have quoted from these publications the results and, to some extent, the processes of the experiments described. It is believed that no means for popularizing the teachings of scientific research has yet been devised which, in scope and far-reaching effectiveness, surpasses this for the diffusion of agricultural science.

A marked feature of the enterprise is the close relation already established between the stations and the farmers. In many of the States members of the station staffs have been either organizers of farmers' institutes or among the foremost workers in them. The calls upon the station officers for public addresses are numerous and increasing. The station correspondence with farmers is very large and touches almost every topic connected with farm theory and practice. Moreover, the results worked out by the stations are applied and enlarged by farmers who conduct trials upon their own farms on plans indicated by the stations, and the proof thus brought of the capacity of our intelligent farmers for experimenting is most gratifying. In short, the station and the farmer are working together and to the advantage of all concerned.

Another encouraging fact is the aid given the stations by State legislatures, local communities, agricultural associations, and private individuals. From these sources the stations have received during the past year about \$125,000 in money, in addition to other gifts of land, buildings, and equipment. This indicates that the generous policy pursued by the General Government is acting already in the case of the stations, as it has done for a longer time in that of the land-grant colleges, as a proper stimulus to generosity on the part of the States, communities,

and individuals, and that on the foundations laid by the General Government are to be built large and strong institutions.

The union with the agricultural colleges, by which the stations have secured the advantages arising from the use of libraries and laboratories and from connection with specialists, teachers, and students; the influences exerted by the Association of American Agricultural Colleges and Experiment Stations, and, finally, the earnestness and enthusiasm of the station workers, all conspire to give the promise of constantly increasing usefulness.

DIVISION OF RECORDS AND EDITING.

While this division, like several others, was actually called into existence last July, when the act of appropriation which included a provision therefor became a law, the work was practically done under another division in such a manner as to necessitate no reorganization of the work when it became an independent division. For convenience it will therefore be referred to in this report as a division, even with regard to the work done before it was properly raised to that dignity.

Since my last report this division has transmitted to the Public Printer the manuscript for eighty bulletins, besides supervising the printing of the Annual Report of the Department. With reference to the majority of these bulletins it has also prepared the usual synopses on the plan indicated in my last report, whereby, as was anticipated, the circulation of the bulletins has not only been greatly increased, but it has been effected far more promptly than was usual heretofore. The advantage of prompt distribution is especially appreciable in regard to the bulletins of this Department, relating as they do to the practical work of agriculture, which itself depends upon times and seasons with such regularity that delay in the distribution of a bulletin of a few weeks or even a few days in some cases may render it unavailable to the farmer for practical use until another season. An effort has been made to exercise greater discrimination in the distribution of bulletins, by which those relating to particular branches of agriculture should reach only those engaged therein. A great waste of bulletins has thus been avoided, and the circle of those who are benefited by the Department bulletins has been enlarged in far greater proportion than the number of copies distributed.

The work of publication of the Department has been much aided by the establishment of the division. Indeed, this work has attained such proportions that it is eminently desirable that there should be one office serving as the channel of all communication between this Department and the Public Printer, and the result has, I believe, been as satisfactory to that official as to ourselves. It is only just that I should here give due credit to the efficient management of the present incumbent of that office for results which have given us during the last twelve months, at an expense slightly less than that of the twelve months pre-

vious, publications aggregating in number of copies 1,133,000, as against 566,000 for the twelve months previous. At the same time a due share of the credit for the excellent results and good administration of our printing fund during the past twelve months belongs to the new division. In spite, however, of these advantages, I regret deeply to have to report that for want of a sufficient printing fund useful publications have had to be unduly postponed, while some have had to be abandoned altogether. The amount at the disposal of the Department for the previous fiscal year was \$39,235.45, a sum even less than that of the year preceding, which was \$40,914.37, and both these years this amount was secured only by obtaining a deficiency appropriation. Notwithstanding the immense increase in the number of divisions over two years ago, and the fact that the accumulated experience and efficiency of divisions long established increase the number of publications, the appropriation for the current year is only \$40,000, a sum less than that expended two years ago.

The measure of the efficiency of the Department of Agriculture is largely its ability to supply practical, useful information to the public, and I can not but deplore in the strongest manner any policy which shall weaken the power of the Department for good in this its most useful field of labor, because that which is essential to the practical results of every other. To concentrate the time and ability of the chiefs of the several divisions and their assistants upon the investigation of problems with which our farmers have to contend, and when practical results have been obtained to withhold the means of making them public for the benefit of those whom the Department is created to serve, seems to reach the heights of unwisdom.

With regard to the publication work of the future, I have found that it will be necessary to divide the publications of the Department into three classes. The scientific work of the several divisions, for obvious reasons, must be recorded in a form available to the scientist and to the student. Even where no practical results are immediately obtained, the work done is so much accomplished on the way toward them, and the preservation of a record thereof for future reference will save to us needless repetition. Limited editions, therefore, of a series intended to serve as a technical record of the scientific work of the several divisions are needed. A second series, in the form of special bulletins containing the results of investigations and information of value to specialists in agriculture, to be issued in editions considerably larger, must be undertaken for the benefit of those who, without being scientific in any sense of the word, are engaged in some practical department of agricultural work, such as horticulture, dairying, stock-raising, etc. In addition to these two series, we have found it desirable to cause the publication from time to time of short practical tracts, inexpensive in form, devoted to some special feature of agricultural work calling for clear, concise instructions, within the comprehension of any person

able to read them, and available for immediate distribution in some particular section or to some particular class. The circulation of these bulletins must vary according to the demands of the occasion.

Again, as in the case of this class of bulletins issued through the Office of Experiment Stations, Farmers' Bulletins 1 and 2, it is desired to give in the plainest possible manner the gist of experimental research throughout the country on some one or other of the many important agricultural problems which it is the province of the stations to investigate and solve. To fully cover the field of publication to the extent which I deem absolutely essential to this Department, I have been obliged to name the sum of \$60,000 as the minimum amount necessary to carry out my purpose. In this connection I will only add that it is not only unsatisfactory, but seriously prejudicial to the efficiency of the work, to be compelled year after year to formulate plans of publication on an insufficient appropriation, trusting to a deficiency appropriation to supplement it. Many of our publications need six months' careful preparation, and, as I have already pointed out, delay in publication when a bulletin is ready often means a loss of one year's time to the farmers of the country.

DIVISION OF ILLUSTRATIONS.

Considerations in some degree analogous to those which led me to establish a division of records and editing led to my organizing the work of illustrations as a separate division, which, under the competent direction of a single chief, should include all the draftsmen and engravers employed in the Department. These have been heretofore scattered here and there among the several divisions, and I concluded that better results would follow from the performance of all the work of this character under the direct supervision of a competent artist. Moreover, I am well satisfied that a considerable saving will be effected in the expensive work of illustration by the existence of an officer charged with responsibility for supervising this branch of the work for all the divisions of the Department, thus affording to the chiefs of the several divisions an associate whom they should consult in reference to all contemplated work of this character. The work of this division has been, as it were, but just begun under the new order of things, even sufficient room having been lacking at the time the division was created; and this room has only just been provided, although I regret to say the accommodations, for reasons which I have sufficiently amplified when dealing with the question of the buildings, are far from adequate for the work required of it.

SEED DIVISION.

The distribution of seeds for the year ending June 30, 1890, exceeded in number of packages that of any in former years, although the appropriation for that purpose was the same as that granted in years im-

mediately preceding. This was due to a radical change made in the method of purchasing seeds, and to which allusion was made in my last report, namely, the employment of a special agent, whose sole duty it is to visit personally different sections of the country and inspect, as far as possible, the product of the seeds offered to the Department and to look up such as seem to possess especially desirable characteristics. The result has been so satisfactory that, with an expenditure of money for the purchase of seeds no greater than that of the previous year, the number of packages of seed distributed has exceeded that of the previous year by three-quarters of a million, the fact being that the total amount of seed distributed by this Department during the last fiscal year would, at the prices paid during the previous year, have cost the Department \$18,000 more than it has. An earnest effort has been made to introduce new and important varieties of seeds, many having been secured for that purpose in foreign countries. I may refer especially in this connection to the Ladoga wheat, Bermuda grass seed, and the sugar-beet seed.

I have also continued and enlarged the distribution of seed to State experiment stations, these institutions having obviously the best facilities for giving the seeds a thorough trial and for making such reports regarding the same to the Department as will enable us to arrive at just conclusions as to the adaptability of the seeds to our climate and soil, as to the best methods of cultivation, etc., thus enabling us to accompany further distribution, if such be decided upon, with intelligent and reliable instructions.

DIVISION OF GARDENS AND GROUNDS.

This division is charged with the care of the grounds and conservatories surrounding and attached to the Department buildings. The grounds include some 40 acres, with roadways, walks, trees, etc., to be looked after and kept in order; and in the conservatories and propagating houses are conducted the propagation and culture of economic plants. The distribution of these plants throughout the country, with due regard of course to the climatic conditions favorable to their growth, devolves upon the superintendent.

The conservatory attached to the Department is a common resort of visitors to the national capital, and I have been impressed with the fact that its educational features have not been as complete as it seems to me is desirable. These conservatories are not only among the finest in the country, but the plants they contain having been selected according to a special design, and embracing a very large variety not only of the ornamental, but especially of the economically useful varieties, much useful instruction would result to visitors by the preparation for free distribution of a carefully prepared catalogue, provided with reference numbers and a plan of the greenhouses, so that the several plants could be readily identified. As so large a portion of the con-

servatories is devoted to plants of economic value, this catalogue should be sufficiently full to explain the value of each plant, as well as the method of cultivation and of the preparation of the commercial product. I have accordingly made arrangements for the preparation of such a catalogue, and am quite satisfied that when completed the work will not only reflect credit upon the superintendent of gardens and grounds, to whom it is intrusted, but will be found of great interest and value to visitors to the conservatories; indeed, it will no doubt have the effect of greatly increasing the number of visitors, especially of those whom it should be the object of all public institutions to serve in a particular manner. I refer to young people in attendance upon our educational institutions.

The plants distributed through this division during the past fiscal year amounted to over 80,000, and included olives, tea, coffee, camphor, strawberries, grapes, both native and foreign, citrus of many species, raspberries, date, palms, figs, Japan persimmons, currants, loquats, guavas, pineapples, black pepper, vanilla, mangoes, and bananas. Reports as to the results obtained with the plants so distributed are encouraging. The culture of the olive is fairly established on the Pacific coast, and it seems likely that it can be profitably established on the Atlantic coast as well, the tree being well adapted to the climates over a wide range in the Southern States. With this end in view, the Department recently imported some of the best selected varieties, which are now being propagated for eventual distribution in suitable localities. There were also distributed some 10,000 cuttings of Smyrna figs of carefully selected varieties, such as furnish the dried figs of commerce.

At present the camphor tree is found well adapted as a shade tree in Florida, where suitable shade trees are a matter of special interest, and many plants have been sent into that State during the past ten years. It is hoped that at some time the plant may be profitably utilized for its commercial products. With the increased demand for camphor, it is believed that the prices for the article would warrant an extension of the plant in some of the Southern States. It has been proved to withstand the climate of the Atlantic coast as far north as Charleston, S. C. It is a hardier tree than the orange, probably nearly as hardy as the olive. To enable those who may desire to experiment with the tree, a quantity of plants will be propagated sufficient for a generous distribution in the near future.

The black pepper, vanilla, cinchona, and the cocoa (*Erythroxylon coca*) are being propagated and have been distributed to some extent. Their success is as yet somewhat problematical, but is possible in some situations in southern Florida, where these plants may obtain permanent foothold.

The importance of this work in the general encouragement of the growth of useful and economic plants is shown by the large amount of

imports of fruits, nuts, spices, and vegetable products, which could certainly be much reduced were the cultivation of these plants undertaken, if only in those limited localities where they can be cultivated with assurance of success.

THE WEATHER BUREAU.

Under an act approved October 1, 1890, Congress directed "that the civilian duties now performed by the Signal Corps of the Army shall hereafter devolve upon a bureau to be known as the Weather Bureau, which, on and after July 1, 1891, shall be established in and attached to the Department of Agriculture."

In accordance with this act I have included estimates for the ensuing fiscal year for carrying on the work of the bureau thus created in this Department. I deem it evident from the discussion which attended the passage of this act, and from the wording of the act itself, that in making this transfer of the Weather Bureau to this Department it was the intention of Congress that the work of the bureau should be extended, in so far as might be necessary to a full coöperation of this branch of the service with the work of the several divisions already established in this Department for the benefit of agriculture, without in any way restricting its general scope. In this spirit I have submitted estimates for the coming year on the basis of the wider range of work thus contemplated, and I take the opportunity of expressing here my own conviction that in many ways the work of meteorological observation which this Department will be thus enabled to carry on in conjunction with its other work, will be found of great value to the farming interests of the country. It is indeed self-evident that to complete the study of soil conditions, of animal and plant life, a study of the climatic conditions of our country is indispensable.

REPRESENTATION OF THE DEPARTMENT AT FAIRS, ETC.

In my last report I referred to the fact that there are held in this country annually a vast number of fairs—usually a State or Territorial fair in every State and Territory in the Union, many other large district or interstate fairs, while county fairs are very nearly as numerous as the number of counties in the whole country. It is a very essential part of the duty of this Department to keep itself well informed in regard to the extent and character of the agricultural resources of all sections of the country, and I know of no opportunity for adding materially to this information at so slight an expense of time and money as is afforded by these exhibitions, which bring together in one place samples of all the best that the country can produce.

It is my desire that the representatives of this Department should be found hereafter at all the principal State fairs, under instructions to make a thorough report on the character of the exhibits, and at the same time to avail themselves of meeting, as they will do on such occasions,

the leading representatives of agricultural interests, from whom much can be learned as to the wants of the farmers, the nature of their difficulties, and the best manner in which the Department can serve them. Furthermore, I desire to carry this system of representation to the fairs as far as possible, even to include county fairs, by availing myself of the coöperation of the large staff of voluntary correspondents of the Department distributed through all sections of the country, and to whose enthusiastic devotion to the cause of agriculture the Department has already been often and much indebted. It seems to me that by such means a sort of bird's-eye view, as it were, might be obtained of the agricultural resources of the country, with the result of supplying this Department with a vast amount of valuable information which can not only not be secured so easily in any other way, but indeed can not be secured at all except by these means.

Among other services which these representatives could render the Department would be the collection and forwarding to the Department museum samples of the various exhibits which at present are too frequently scattered and lost. This subject naturally leads to the consideration of the necessity for a more frequent interchange of thought between this Department and the agricultural intelligence of the country. I called attention in my last report to the fact that there had been, especially in the past few years in the United States, an enormous development in the agricultural organizations devoted to the farmer's self-improvement. Our dairy associations, our horticultural, live stock, and kindred societies, have not only multiplied as to number, but to-day are far more active in holding meetings and conventions than they have ever been before. The farmer's institutes are meetings of a general character, attended usually by the best farmers in the sections in which they are held, and bringing together the best agricultural thought and practice. Not only do I deem it to be of the utmost importance, indeed a solemn duty devolving upon this Department, that these meetings and gatherings should be encouraged in every possible way by their representative Department in the National Government, but I conceive it to be absolutely necessary for the intelligent conduct of the work of this Department that it should be frequently represented at such meetings, not only for the encouragement and benefit of those present, but for the benefit of this Department and its division chiefs.

Speaking from my own experience, I am aware that in the large section of country with which I am familiar, from an agricultural standpoint, most important meetings have been held in recent years. Questions of the gravest import to the agriculture of this country have been discussed at these meetings, and yet rarely indeed has there been present any person representing the National Department of Agriculture who could speak for it, and what is still more important, learn for it the views and wants of these people. This is a condition of affairs which calls for immediate remedy, and in so far as the liberality of

Congress will enable me to do so, I am determined to provide that remedy. It is only by the closest coöperation between this Department and the agricultural societies—the granges, the alliances, etc.—that the work of the Department can be carried to its highest development and attain its greatest usefulness, and I recommend that a special fund be placed at my disposal for this purpose.

COLUMBIAN WORLD'S FAIR.

The act of Congress approved April 25, 1890, gave national assent to the recognition of the proposition to hold a World's Columbian Exposition in the city of Chicago in the year 1893. The bill provides that there shall be prepared a governmental exhibit. For the purpose of securing harmony of installation and arrangement, it was provided that a board consisting of persons to be designated, one each by the head of each Department, should be formed. In compliance with this law I designated the Hon. Edwin Willits, Assistant Secretary of Agriculture, as representative of this Department upon the board, and you ratified this nomination and designated him as its chairman. Mr. Willits informs me that doubt upon the part of the accounting officers of the Treasury has already been expressed as to the availability of the funds appropriated by Congress for the work in hand, and at this writing we have an intimation that nothing can be purchased, nothing constructed, nothing exhibited which is not now in the Departments, and that no outside assistance can be employed in any branch of the work of preparation.

In so far as the Agricultural Department is concerned, I say without reservation it were better to abandon the attempt to make any exhibit than to undertake the task with such limitations. It certainly is not my intention to enter the Exposition field in competition with the private, State, or corporate exhibitor, but beyond this field there lies a wide region wherein this Department may operate in illustrating those functions which are peculiarly its own. This Department is instinct with science. A process can not be fully illustrated on a printed page, and this Exposition furnishes a rare opportunity, which hardly comes twice in a lifetime, to supplement the publications, at present its only means of communicating with the public, by a spectacular exhibition of current methods of dealing with agricultural problems and processes. If the work devolving upon this Department in connection with this Exposition is to be undertaken at all, it must be in such a manner as to guarantee satisfactory results; and in its performance we must be left at liberty to avail ourselves of such material and such expert assistance as we can find adapted to the purpose. I commend the subject to your attention in the hope that any obstacles to effective work now existing may be removed by Congress, and that the work may proceed without delay.

THE MUSEUM.

The needs of the Museum have continued to receive my most thoughtful attention. A marked improvement in the appearance of the exhibit has been effected by its rearrangement and renovation; and plans have been perfected by which, it is believed, the aid recently granted by Congress will be applied to the best possible advantage. The educational, scientific, and historical interests which would be promoted by a distinctly agricultural museum of suitable character are too generally recognized to need urging at this time. It should be a matter of regret, however, that for the thousands who annually visit us from abroad, impressed in advance with the magnitude and diversity of our agricultural productions, we should have no permanent national collection fitly illustrating the products of our soil. The need of such a collection, moreover, is being keenly felt in investigations prosecuted by this Department, and involving important economic questions, the solution of which could be materially facilitated and hastened by access to the actual results of cereal growth attained under various conditions of soil, climate, and culture. I deem it a fitting time to suggest that proper foresight on the part of Congress should secure for this Department, after their exhibition at the Columbian Exposition, such available articles relating to the operations of agriculture as shall be worthy of a place in a permanent exhibit; and that in the meantime suitable provision be made for the accommodation of the present collection and subsequent accessions.

ADEQUATE BUILDING FACILITIES.

A consideration of the wants of the Museum brings me to the question of adequate building facilities. The want of these is conspicuously illustrated by the unavoidable utilization of a huge, unsightly wooden structure, far inferior to many an exhibition building on a country fair ground, as an agricultural museum; furthermore, the building being made to do service on occasion as a general storage warehouse, and to accommodate not only the silk filature and cocooneries, but a number of offices for which I need hardly say it is most illy adapted. Moreover, its use for this purpose necessitates dividing the force of several divisions, one part of the force being at work in one building and another part in another, a condition of things which is found a serious impediment in carrying on the work. All the more important divisions are suffering grave inconvenience, and important work is unavoidably delayed owing to this condition of things; in fact, a vast amount of time and pains, which might have been profitably devoted to more important work, has to be unavoidably spent in devising ways and means to overcome, or at least to mitigate, the embarrassment and annoyances, amounting to serious obstruction to the work of the Department, entailed by this want of room.

I must therefore renew in the most energetic manner by earnest recommendation that immediate steps be taken to provide this Department with an additional building, suitable for the accommodation of all the laboratory work of the Department, and at the same time of a number of the offices, as well as with fireproof accommodations for the reception of the valuable herbarium and other property of the Department, which it has cost years of labor and large sums of money to accumulate, and which, if they should ever be destroyed, no amount of time and no amount of money could possibly replace.

PROMOTION OF CORN CONSUMPTION IN EUROPE.

I have long been impressed with the necessity of taking measures to promote the consumption of Indian corn in foreign countries. The facility with which we can raise this cereal, its generally low price, and the occasional glut in the home market in years when the yield has been especially large, make an increase in our exports of corn extremely desirable. It is essentially an American cereal, one which can be grown in all parts of this great country, and the area adapted to which is practically illimitable. Not more than 20 per cent of the crop on an average is moved outside of the county in which it is grown, and to the extent to which this indicates the utilization of the crop for feeding purposes on the farms where it is grown this is well; but when we realize that this fact is due in part at least, especially in years, like the last, of an ample yield, to the absolute want of demand, our home markets being fully supplied, it is certainly a matter of profound regret that there does not exist a foreign demand sufficient to relieve the glut at home, and to secure for our farmers in the West a price which would be adequate at least to save them from loss on the growing of the crop.

During the past ten years our exports have hardly exceeded 3 or 4 per cent of the total crop. This is due largely to the fact that corn is utilized throughout the greater portion of Europe solely as food for animals, and then only when its very low price tempts the feeders. As a food for human beings it is practically unknown, save in some sections of southern Europe, while in the greater part of that continent it can not even be grown to maturity. I have recently determined to avail myself of the presence in Europe of Col. Charles J. Murphy, a well-known authority and enthusiast on the subject of the increase of our corn export, who has been commissioned by me to make a report to this Department upon the general subject of the promotion of the use of Indian corn as a human food in European countries. Col. Murphy's report will be made the subject of a special bulletin as soon as it shall have been received, and will no doubt treat of this important subject practically and well.

REPRESENTATION OF THE DEPARTMENT ABROAD.

I desire to record here very emphatically my conviction that some method must be adopted by which, as occasion requires and without long delays, this Department shall be enabled to send representatives to foreign countries in cases where only personal visits can be relied on to secure much-needed information. The subject of world-wide competition has been dwelt upon at length on so many occasions that it would be purely superfluous to insist here upon the active competition which meets our own farmers in every market where their products are offered for sale. The commercial side of this condition of things is well understood, but it does not seem to be so clearly understood or so well appreciated that there is an intellectual competition which is even more serious than the other, in that it is the basis of the other.

Where wise economic legislation is the cure, the perfection of agricultural methods, which means the maximum of production at the minimum of cost, is the prevention of agricultural troubles. In our pursuit after this perfection we must study the methods of all other countries that attain or approach it in any branch of agriculture. We must be prepared to learn all that is to be learned elsewhere, and then wisely adapt the information so obtained to the conditions of the American farmer. Consequently that information must be acquired by men who are themselves familiar with our own agricultural conditions. This plan, except in so far as it is now offered on behalf of agriculture, is by no means a new or original one. It is but a few years since that a commission of distinguished military officers visited many of the European countries and British India for the purpose of studying the equipment of foreign armies with a view of adapting to our own military service all that might seem to be advantageous. I have understood that the report brought back by these gentlemen was regarded by high authorities as most valuable. In this respect, as in many others, agriculture has not had the fair treatment which, in spite of the fact that it is beyond dispute the most important industry in the country, is, after all, all that it asks for. The suggestion of sending a well-qualified representative abroad purely in the interest of agriculture is caviled at as a means of affording a pleasure trip to some broken-down professor. It is time that we rose superior to such humiliating and unworthy puerility.

It may be well, perhaps, in this connection to call attention to the fact that we are in this respect far behind the other nations of the world, however disagreeable it may be to confess it. Important gatherings of men devoted to agricultural science, and enjoying by the courtesy of the Government under whose jurisdiction they assemble every privilege and facility for gaining information in regard to the agriculture of that country, are constantly being held in various parts of the world, at which representatives of this, the greatest agricultural country in the world, are conspicuous by their absence, and when we

are represented it is often by some wealthy amateur enjoying his ease abroad, or, as is sometimes the case, by some enthusiast, who, at a sacrifice of time and money which he can ill afford to spare, manages to attend; but officially this country and this Department are very rarely represented on such occasions. A most notable instance of our omissions in this respect was furnished during the meeting last September of an international agricultural congress at Vienna, in which we had been especially invited to participate by the Austro-Hungarian Government, at which over 1,100 delegates were present, including distinguished representatives of agricultural interests from every country in Europe, from Japan, from Australia, from India, and from South America, and at which were discussed subjects of profound interest to American agriculture. This was a meeting at which, for many reasons, it was most desirable that the United States, through this Department, should have been officially represented. Unfortunately, for want of adequate provision, the United States alone, of all the leading countries of the world, was absent.

Let me here recall the fact that since I had the honor to assume the office of Secretary of Agriculture I have been visited by gentlemen from Austria-Hungary, Germany, Bavaria, France, Great Britain, Canada, Australia, New Zealand, Japan, and even from one of the native principalities of the East Indies, the official representatives of departments analogous to my own in their native countries, traveling under orders from and under the pay of their respective governments, armed with all the official credentials necessary to secure to them every attention and courtesy necessary to the prosecution of their inquiries. Thus do these countries indicate their willingness to learn whatever we may be able to teach them. Thus do they recognize the fact upon which I have already insisted—that there is an intellectual as well as a commercial competition, to which the old maxim, “Knowledge is power,” applies with a force which all must recognize.

In concluding this—my second annual report as Secretary of Agriculture—I feel amply justified in expressing my general satisfaction at the condition of agricultural matters in our country. It is true that in many cases the effects of former agricultural depression are still felt, and it is also true that in a vast country like ours there must be at all times more or less depression existing in one section or another and affecting some local interests. Nevertheless, a careful review of the events of the past year and a general survey of the agricultural field to day betoken marked improvement in the condition of our agriculturists and promise well for their future well-being.

The recognition of agricultural interests in recent national legislation will have the double effect of assuring the farmers of the appreciation of their wants as a class by our public men and of securing to

them many beneficial results in the near future. I have also had frequent opportunities of noting with sincere gratification the rapidly growing tendency of our farmers to avail themselves of the work of this Department in its many branches and their constant thirst for more information, not only in regard to the statistics of agriculture, but as to the scientific principles which all are now beginning to recognize as lying at the very foundation of successful agricultural work. That the means for imparting this information exist in this country through the liberality of the National Government on a scale far beyond any that has been attempted in any other country under the sun, is a fact which all must gratefully acknowledge, while this very fact, coupled with the earnest demands for increasing information, it must not be forgotten, adds largely to the burden of responsibility imposed upon this Department and its officers, upon the national legislature, which is responsible for providing it with the means necessary to enable it to satisfy these constantly increasing demands for information and advice, and upon those numerous institutions scattered throughout the country and specially endowed from the national Treasury to labor for the benefit of agriculture.

Much indeed has been done for agriculture in this country. Much more remains yet to be done; but relying upon the results of an earnest coöperation on the part of all the great forces which I have indicated as at work in this behalf, and confident of the cordial support of the people of the United States in all steps taken by the National Government to further the interests of that great foundation industry of agriculture, upon which the future prosperity of the country so essentially depends, I look forward with courage to the work that lies before us in the future and with confidence to the time when, in the high quality of its work as well as in the magnitude of its enterprise, the agriculture of the United States shall not only lead all other industries in this country, but shall be the leader in this great industry of all other countries.

In the hope that together with the people of the United States you may be led to the same encouraging conviction by a consideration of this report, I have the honor to respectfully submit the same.

Very respectfully, your obedient servant,

J. M. RUSK,
Secretary.

REPORT
OF THE
SECRETARY OF AGRICULTURE

1891.

WASHINGTON
GOVERNMENT PRINTING OFFICE
1891



REPORT

OF THE

SECRETARY OF AGRICULTURE.

DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., October 27, 1891.

To the PRESIDENT:

I have the honor to submit my third annual report as Secretary of Agriculture, and it is with no little gratification that I assume this duty. Two years ago the condition of agriculture was a subject of grave anxiety, an anxiety which among the farmers themselves found vent in an almost universal expression of unrest and discontent with existing conditions. Last year I was able to indicate the beginning of an improved condition of agriculture in response to the well-directed efforts of your administration, aided by the wise enactments of Congress, and to point out the several methods adopted in the Department of Agriculture with a view to ameliorating the condition of our farmers, and to record also indications of their successful outcome. To-day I lay before you a report full of encouragement. The good work so promptly undertaken has been maintained and developed. The time that has elapsed since some of the most important measures for the benefit of the farmer were adopted, short though it has been, has already served to produce many of the good results expected of them. The work of this Department on behalf of the farmer has been constant and varied, every effort being made to enlarge the sphere of its usefulness to the fullest extent compatible with the means placed at my disposal, and the responsibilities and powers imposed upon the Department by wise legislation have been exercised with due appreciation of their importance, and pushed forward with energy and activity. In carrying on this work it gratifies me to be able to acknowledge the cordial good will and intelligent activity which the responsible officers of the Department have brought to my aid.

The wide enlargement of the powers of this Department, the general recognition of the added dignity which attaches to an executive depart-

ment of the Government, and, in general, the sense of enlarged ability for the accomplishment of good, have had the natural result of serving as an incentive to further effort on the part of every member of the force. Furthermore, our efforts have been encouraged by rapidly increasing recognition of the value of the Department, and of its possibilities on behalf of practical agriculture. Evidences of such appreciation are, and have been, multiplying from all sections of the country and from all classes of our people. Not only has the efficiency of the Department been cordially recognized within the limits of our own country, but its work has elicited practical tokens of appreciation abroad, of the greatest value to our agricultural interests.

It is also a matter of congratulation that in this year of plenty we shall be able out of our abundance to supply needed nourishment to many millions of people in Europe who have not been as fortunate as ourselves in reaping a full harvest.

I have the honor to present herewith tables and other statistical data of interest in this connection. The tables showing prices of agricultural products give wholesale prices at points selected to represent every section of the country. The figures given are prices on the first trading day of the month, and the months given are selected in order that a comparison of present prices with those ruling about the same time in 1889 and 1890 may be made. The showing of advance in values of live stock at Chicago is particularly gratifying, indicating as it does a healthy reaction from the depression under which the live-stock industry labored during recent years.

Wholesale prices of agricultural products at leading cities in all sections of the United States

CORN.
[Per bushel.]

Date.	Boston.	New York.	Atlanta.	New Orleans.	Cincinnati.	Chicago.	St. Paul.	St. Louis.	San Francisco (per cental).
1891.									
August.....	No. 2 mixed. \$0.76 - \$0.77	No. 2 mixed. \$0.71½ - \$0.72	White. \$0.87	No. 2 mixed. \$0.72	No. 2 mixed. \$0.63	No. 2. \$0.60 - \$0.60½	No. 2 mixed. \$0.58 - \$0.60	No. 2. \$0.53½ - \$0.54	No. 1 white. \$2.05 - \$2.11
September.....	.76	.74 - .75	.85	\$0.74 - .75	\$0.64 - .64½	.64½ - .65	.58 - .59	.58½ - .59	1.85 - 1.87½
October.....	.67 - .68	.61½ - .62	.82	.69 - .70	.57	.52½ - .53½	.48 - .52	.53	.....
1890.									
August.....	.57½ - .58	.52½ - .52½	.67	.55	.49 - .50	.45½ - .46	.44 - .46	.43½	1.17½ - 1.20
September.....	.57½ - .58	.53½ - .54½	.70	.61	.48½ - .49	.45½ - .46	.47½ - .49	.44 - .44½	1.32½ - 1.35
October.....	.60	.56 - .56½	.68	.63	.53 - .53½	.47½ - .48½	.47 - .48	.47½ - .48	1.27½ - 1.30
1889.									
August.....	.48½	.44½ - .44½	\$0.56 - .58	.45 - .45½	.38 - .38½	.36½	.34 - .35	.33½	1.35
September.....	.47	.42½ - .43	.56 - .58	.45	.35	.32½	.34½	.29½	1.12½
October.....	.44 - .44½	.39½ - .39½	.54 - .56	.44 - .45	.36 - .37	.31 - .31½	.31½ - .32	.29½	.....

WHEAT.
[Per bushel.]

	No. 2 R. W.	Winter.	No. 2 R. W.	No. 2 R. W.	No. 2 North'n.	No. 2 R. W.	No. 1 white.
1891.							
August.....	\$0.99 - \$0.99½	.....	\$0.87 - \$0.87½	\$0.87½ - \$0.88	\$0.92 - \$0.93	\$0.84½ - \$0.84½	\$1.55 - \$1.56½
September.....	1.07½ - 1.08½	.....	.98½ - .99	.98½ - .99½	.88 - .91	.97½ - .97½	1.70 - 1.71½
October.....	1.03½ - 1.04½	.....	.97 - .97½	.95 - .95½	.87 - .88	.93½ - .93½	.....
1890.							
August.....	.97½ - .97½	.....	.93	.91 - .91½	.88 - .90	.88	1.37½
September.....	1.04½ - 1.06	.....	1.00	1.00½ - 1.03	.....	.96½ - .99½	1.37½ - 1.38½
October.....	1.02½ - 1.03½	.....	.97 - .99	.96½ - .97½	.90 - .91	.97½ - .98½	1.32½
1889.							
August.....	.88½ - .89½	.....	.78 - .79	.78 - .78½	.84 - .86	.74½	1.33½
September.....	.85½ - .86½	\$0.78½ - \$0.79½	.75 - .76	.78 - .78½	.73 - .74	.76½	1.28½
October.....	.86½ - .87	.78 - .79	.81 - .83	.81½ - .82	.75	.79½	1.32½

Wholesale prices of agricultural products at leading cities in all sections of the United States—Continued.
OATS.

[Per bushel.]

Date.	Boston.	New York.	Atlanta.	New Orleans.	Cincinnati.	Chicago.	St. Paul.	St. Louis.	San Francisco (per cental).
1891.									
August.....	No. 2, white. \$0.48-\$0.50	No. 2, mixed. \$0.37	No. 2, mixed. \$0.50	No. 2. \$0.45	No. 2, mixed. \$0.31½-\$0.32½	No. 2. \$0.27½-28	No. 2, white. \$0.37-\$0.38	No. 2. \$0.27½-\$0.28	No. 1. \$1.47½
September.....	.41	\$0.35½-.35¾	.46	.41	.31½-.32	.28½-.28¾	.27-.28	.28	\$1.32½-1.35
October.....	.37-.37½	.33-.33½	.44	.37½	.30½-.31½	.26¾-.27	.27-.28	.27½	.....
1890.									
August.....	.44½-.45½	.40	.48	.45	.36¾-.39	.32½-.34	.....	.33½	1.60
September.....	.46-.46½	.40½-.40¾	.50	\$0.47-.48	.38½-.39	.35-.35½	.....	.33	1.60-1.62½
October.....	.47½-.48½	.43¾-.44	.50	.47	.40½-.41	.38½-.38¾	.....	.39	1.52½-1.55
1889.									
August.....	.35-.36½	.27¾-.28	\$0.37-.38	.32	*.26	.21½	.27-.28	.21½	1.12½
September.....	.31-.31½	.26¾	.32-.34	.28½-.29½	.21-.21½	.19½	.20-.22	.18	1.12½
October.....	.30-.31	.26¾-.26¾	.32-.34	.28-.28½	.22½-.23	.19½-.19¾	.22-.23	.20	1.12½

* Old.

BARLEY.

[Per bushel.]

	No. 2, C. W.	No. 1, Canada.	No. 2, Spring. \$0.75-\$0.78	Choice. \$0.55-\$0.60	No. 2, Nominal	Prime.	No. 1, Chevalier. \$1.65
1891.							
August.....			.70-.72	.60-.68			1.37½
September.....			.68-.70	.40-.56	\$0.55-\$0.57	\$0.50-\$0.60	.....
October.....				.62-.65			
1890.				.54-.65			\$1.40-1.45
August.....	†\$0.62		.74-.75	.58-.70	.65	.72	1.50-1.55
September.....	†.68						1.50-1.52½
October.....	†.70	\$0.95					
1889.							
August.....			.70	.66	.55		1.40
September.....	\$0.85-.95		.60	.45-.55	.55	.60	1.45
October.....	.80-.90						1.45

† Price for No. 1.

COTTON.

[Per pound.]

	<i>Middling up.</i>		<i>Middling.</i>		<i>Middling.</i>		<i>Middling.</i>
1891.							
August.....	\$0.08	\$0.08	\$0.07 $\frac{1}{2}$				<i>Middling.</i> \$0.07 $\frac{1}{2}$
September.....	.08 $\frac{1}{2}$	.08 $\frac{1}{2}$	.08				.08
October.....	.08 $\frac{1}{2}$	.08 $\frac{1}{2}$	.08 $\frac{1}{2}$				.08 $\frac{1}{2}$
1890.							
August.....	.12 $\frac{1}{2}$	.10	.11 $\frac{1}{2}$		.12		.11 $\frac{1}{2}$
September.....	.11	.10 $\frac{1}{2}$	.10 $\frac{1}{2}$		.11 $\frac{1}{2}$		.10 $\frac{1}{2}$
October.....	.10 $\frac{1}{2}$	.08 $\frac{1}{2}$ -.09	.10 $\frac{1}{2}$		.10 $\frac{1}{2}$		.10
1889.							
August.....	.11 $\frac{1}{2}$	.10 $\frac{1}{2}$	.11		.11		.10 $\frac{1}{2}$
September.....	.11 $\frac{1}{2}$	.11	.10 $\frac{1}{2}$		.11 $\frac{1}{2}$		.11
October.....	.10 $\frac{1}{2}$	.10 $\frac{1}{2}$ -.10 $\frac{3}{4}$	.10 $\frac{1}{2}$		.10 $\frac{1}{2}$		.10 $\frac{1}{2}$

BUTTER.

[Per pound.]

	<i>Extra cream- ery.</i>	<i>Ste. dairy best.</i>		<i>Fancy cream- ery.</i>		<i>Creamery.</i>	<i>Good to choice.</i>
1891.							
August.....	\$0.20	\$0.17-\$0.18		\$0.19-\$0.20		\$0.18	\$0.22 $\frac{1}{2}$ -\$0.26
September.....	.23-.24	.21		.26		.23	.22 $\frac{1}{2}$ -.26
October.....	.25-.26	.22 $\frac{1}{2}$ -.23		.26		.24-.27	
1890.							
August.....	.19-.20	.16		.19-.20		.17-.19	.20-.21
September.....	.26	.22-.23		.24-.25		.26	.22 $\frac{1}{2}$ -.25
October.....	.25-.26	.20-.21		.25		.18-.19	.20-.30
1889.							
August.....	.20	.17-.17 $\frac{1}{2}$		.18-.20		.14-.16	.18 $\frac{1}{2}$ -.21
September.....	.21-.22	.17-.18		.20-.21		.17	.22 $\frac{1}{2}$ -.24
October.....	.25-.26	.24		.26-.27		.20-.25	.26-.28

EGGS.
[Per dozen.]

Date.	Boston.	New York.	Atlanta.	New Orleans.	Cincinnati.	Chicago.	St. Paul.	St. Louis.	San Francisco (per cental).
1891.	<i>Eastern extra.</i>								<i>Choice.</i>
August.....	\$0.20	\$0.17½-\$0.18	\$0.12½	.....	\$0.12½-\$0.13	\$0.14½-\$0.15	\$0.14-\$0.15	\$0.11	\$0.27½-\$0.30
September.....	.20	.19½-.20	.18-.20	.....	.16-.17	.16-.16½	.13½-.14	.16	.29-.30
October.....	.22	.22	.19-.21	.....	.17	.18-.18½	.16-.17	.16½	.....
1890.									
August.....	.20-.21	.19	.15	.....	.11½-.12	.12-.13	.15-.19½	.10½	.22½-.25
September.....	.22	.21-.21½	.16	.....	.16	.15-.16½	.15-.19½	.13½	.37½
October.....	.23	.22½	.20	.....	.17-.17½	.17½-.18½	.17½-.18½	.16½	.34-.36
1889.									
August.....	.17-.18	.15½	.14-.15	.....	.11	.....	.11½-.12	.10	.30
September.....	.20	.19½	.19-.21	.....	.14	.....	.13½-.14	.12½	.32½
October.....	.23-.24	.24-.24½	.18-.20	.....	.16½-.17	.15-.15½	.18-.19	.14½	.40

Wholesale prices of agricultural products at leading cities in all sections of the United States—Continued.

TOBACCO.

Date.	New York.		St. Louis.			
	Pennsylvania seed leaf.		Missouri Burley leaf, medium to good.		Old-style leaf, medium to good.	
1891.	<i>Per pound.</i>		<i>Per 100 pounds.</i>		<i>Per 100 pounds.</i>	
Aug. 1	\$0.08½ to \$0.13		\$7.50 to \$10.00		\$5.50 to \$7.00	
Sept. 1 .....	.12½	.16	7.00	12.00	6.00	7.00
Oct. 1 .....	.12½	.16	7.00	10.00	5.00	8.00
1890.						
Aug. 1 .....	.08	.30	8.00	10.00	6.50	10.00
Sept. 1 .....	.08	.30	7.50	12.00	4.00	8.00
Oct. 1 .....	.08½	.13	7.00	10.00	5.00	7.00
1889.						
Aug. 1 .....	.08	.30	8.00	12.00	6.00	7.50
Sept. 2 .....	.08	.30	8.00	12.00	5.00	7.50
Oct. 1 .....	.08	.30	7.50	10.00	5.00	6.50

Statement showing the exports of wheat and wheat flour for the years 1887 to 1891, inclusive.

Year.	Bushels of wheat.	Barrels of flour.	Total bushels of wheat.
1887	101,971,949	11,518,449	153,804,970
1888	65,789,261	11,963,574	119,625,344
1889	46,414,129	9,374,803	88,600,743
1890	54,387,767	12,231,711	109,430,467
1891	55,131,948	11,344,304	106,181,316

Prices of live stock in Chicago market.

[Per 100 pounds.]

	Hogs.		Cattle.			Sheep.	
	Light.	Heavy packing.	Choice to fancy.	Good to choice.	Butchers' steers.	Westerns.	Natives.
1891.							
Oct. 2	\$4.10-\$5.00	\$4.75-\$5.35	\$6.00-\$6.25	\$4.60-\$5.90	\$3.60-\$4.30	\$3.50-\$4.45	\$3.50-\$4.90
Sept. 1	4.85- 5.75	5.00- 5.45	5.90- 6.30	4.90- 5.80	3.75- 4.40	3.50- 4.50	3.50- 5.10
Aug. 4	4.90- 5.90	5.10- 5.70	5.70- 6.25	4.90- 5.60	3.75- 4.40	3.50- 4.80	3.75- 5.25
1890.							
Oct. 4	4.10- 4.70	4.10- 4.60	4.65- 5.15	4.15- 4.70	3.00- 3.40	3.25- 3.90	3.25- 4.90
Sept. 2	3.90- 4.60	4.10- 4.55	4.75- 5.20	4.00- 4.65	3.00- 3.50	3.25- 4.40	3.25- 4.80
Aug. 2	3.70- 3.95	3.70- 3.85	4.25- 4.75	3.60- 4.20	3.00- 3.50	3.25- 4.65	3.50- 5.00
1889.							
Oct. 1	4.20- 4.85	4.05- 4.40	3.80- 4.75	3.00- 3.70	2.75- 3.25	3.25- 4.30	3.50- 4.75
Sept. 3	3.95- 4.70	3.70- 4.10	3.75- 4.70	3.00- 3.70	2.60- 2.90	3.25- 4.10	3.40- 4.65
Aug. 3	4.25- 4.60	4.20- 4.40	3.75- 4.65	3.00- 3.60	2.60- 2.90	3.25- 4.10	3.50- 4.75

CROP VALUES OF THE YEAR.

The extraordinary fact concerning crop values of the year, at least as to cereals and meats, is that they are so well sustained in the presence of abundant yields. Corn is so far higher than in last October, and the increased quantity, at current values, makes the increment of value from two to three hundred million dollars.

Wheat, with a crop almost 50 per cent greater than last year, and the largest yield ever recorded in this country, and the largest product ever harvested in any country, commands about the same prices in the great markets as last year. Oats are lower, with immense increase of production. Barley has held its value in the face of a large crop on an enlarged area, as the new duty has kept out a large part of the usual imports, and at least a portion of the duty on the little imported has been virtually paid by the foreign growers.

The increased value of all cereals over that of last year, on the basis of October values, is not less than \$500,000,000.

The increased value of meats over those prevailing in October of last year is about 15 per cent on export values of beeves and meats exported, and 15 to 20 per cent on Chicago prices of beeves of different grades. The increase in wholesale values of all meats, on the basis of current prices, may reach \$150,000,000. Cotton is lower this year. The large product and good prices of fruits will more than double fruit values of last year.

Taking all products together, in comparison with last year at prices current in October, the aggregate increase of value can not be less than \$700,000,000.

AGRICULTURAL EXPORTS.

A review of our exports of agricultural products during five years past shows that the exports of 1891, following the bad crop year of 1890, are larger by more than \$12,000,000 than those of the preceding year, and \$100,000,000 in excess of those of 1889. Had our exports of breadstuffs in 1891 been as large as those of the previous year, the agricultural exports of the fiscal year just closed would have exceeded \$650,000,000, or more than our total exports of all domestic products in any year prior to 1878. The indications now are that our sales abroad of the surplus from our farms will, during the present year, largely exceed the trade of any previous year.

During the first three months of the present fiscal year our exports in cereals alone have aggregated in value over \$76,000,000, made up as follows:

	Quantity.	Value per unit of quantity.	Value.
Barley .....bushels..	490,650	.64	\$315,440
Corn.....do....	7,097,342	.66	4,708,247
Oats.....do....	528,915	.41	218,253
Rye.....do....	4,269,936	.93	3,956,784
Wheat.....do....	50,414,889	1.05	52,734,641
Flour.....barrels..	2,828,743	5.11	14,449,262

For the corresponding period of 1890 the total exports of these products aggregate but \$28,278,120, at values per unit of quantity as follows:

Barley.....	\$0.65
Corn.....	.48
Oats.....	.37
Rye.....	.61
Wheat.....	.92
Wheat flour.....	4.73

AGRICULTURAL IMPORTS.

An examination of our imports for the period, October 1 to July 31, 1889-'90, and 1890-'91, affords an interesting comparison of trade in agricultural products during the first ten months under our present law, and for the same period during the last year of the old law. The total purchases have increased \$28,000,000, but an analysis shows that the competition with our own agriculture has sensibly diminished under present customs regulations. This increase is confined to the free list or articles not competing with our production. Sugar, free of duty since April 1, 1891, contributes \$20,000,000 increase; tea, coffee, and cocoa, \$15,000,000; vegetable fibers, \$3,000,000. The change in rates has at the same time checked the importation of products which may be produced at home, and to this extent stimulated prices and production here. Tobacco is a notable example, only \$6,000,000 coming during the last ten months, against \$17,000,000 during the preceding period. The competition of Sumatra leaf has been largely done away with, and as a result the price of Connecticut seed-leaf fine wrappers in New York on October 1 is quoted at 25 to 42½ cents per pound, against 22 to 37½ in 1890, when the provisions of the new tariff were already known and about to go into effect, and 18 to 32½ in 1889, when the old competition was in full force. Foreign purchases of barley show a falling off of nearly \$3,500,000, and eggs more than \$1,250,000.

A noticeable falling off in the import of horses (from 3,380,529 to

1,903,049), and a gradual falling off in the imports of all live stock, suggest that our present system of inspection, and the law which prohibits the introduction of any but pure-bred stock duty free "for breeding purposes," is having the effect designed, of excluding a large number of animals of a class heretofore fraudulently introduced duty free.

The large quantities of hides which are being shipped to the United States from foreign countries, and are admitted free of duty, have caused a great depreciation in the prices realized for hides of domestic production. This has had a marked tendency toward keeping down the price of cattle, and has consequently added to the burdens of our agricultural population. I would therefore most earnestly recommend that the duty provided for in section 3 of "An act to reduce the revenue and equalize duties on imports, and for other purposes," approved October 1, 1890, be imposed in all cases where the countries from which such hides are shipped have not granted equal concessions in regard to the admission of the agricultural products of the United States.

The withdrawal by some of the foreign governments of restrictions which weighed heavily upon one of the most important of our agricultural industries—the animal industry—in response to the prompt and efficient performance by this Department of the responsible duties of inspection imposed upon it by the legislation of the last Congress, is one of the most gratifying features it is my duty to record in this report.

The action of the Governments of Germany, Denmark, and Italy in this regard deserves more than a passing word of congratulation, especially as this course seems likely to commend itself to other nations in Europe with whom we have reason to believe a large trade in this product could be built up. In the first place, it is becoming that the head of this Department should acknowledge in fitting terms, on behalf of his own Department, as well as on behalf of the important interests confided to his care, the warm personal interest ever accorded by yourself to all matters relating to the agricultural industry which I have had occasion to submit for your consideration, and without which this grand result could never have been attained. I should also not fail to acknowledge the cordial coöperation of the Department of State and of those diplomatic representatives abroad who have so intelligently and earnestly presented this subject to foreign governments.

In the second place. I want to emphasize, in referring to this subject, the beneficent effects of the wise extension of the powers conferred upon this Department, as affording not only a most gratifying recognition by foreign governments of the efficiency of the work of the Department, but as furnishing, in my opinion, a striking illustration of one method by which the interests of the farmer can be legitimately fostered by the National Government. It should therefore serve as an incentive to further efforts on similar lines.

The subject of meat inspection suggests other important considerations in relation to other food products to which I desire to call your

attention, first briefly reviewing the conditions which called the meat-inspection law into being.

The interest of our people in meat inspection has been great and has been increasing for years. With the concentration of the great bulk of the slaughtering business in a few large cities, where it is conducted on an enormous scale, the feeling became strong that there should be more rigid supervision for the protection of the health of consumers than was given by the local authorities where the abattoirs were located. This feeling found expression in legislation in various States, designed to secure the inspection of meat introduced from beyond their territory. On the ground, however, that such laws proved to be to a greater or less extent a regulation of interstate commerce, they were in most, if not in all, cases held to be unconstitutional, and the desired object was not accomplished.

In addition to this very natural desire of our own consumers to be protected from all real or fancied dangers to their health, there were to be considered the fears excited abroad by alarming, though unfounded statements of sensationalists and others interested in injuring our export trade. If we were to keep our foreign markets it became evident that we should not only send to them the very best of meats, but that these should be accompanied by evidence that they had been properly inspected and that the animals from which they came were perfectly sound, and free from any taint and infection.

In the light of these conditions the last Congress passed the act of March 3, 1891, providing for the inspection of live cattle, hogs, and the carcasses and products thereof, which are the subjects of interstate commerce, thereby giving authority for an inspection of animals and meats as comprehensive and thorough as exists in any part of the world. This inspection has been organized in the chief centers of the business, and is being extended as rapidly as possible. The reports of the inspectors have confirmed the statement made in my previous reports that our pork and beef, produced as it is from the meadows and cornfields of a salubrious country, can not be surpassed by similar products from any section of the world.

As is the case in every country, however, there are some diseases affecting food-producing animals in the United States, which make it necessary that this inspection should be maintained for sanitary reasons. The disease known as tuberculosis, which exists in all parts of the world, particularly among neat cattle, is believed to be dangerous to the consumers of the meat and milk of affected animals; and the presence of this disease alone should be a sufficient reason for an inspection which would guard against the sale of the tainted products of such animals. But our people demand something more than protection from communicable diseases. From being long accustomed to markets having a surplus of meats, even our working people purchase the best cuts from healthy animals, and they would not knowingly accept for

food at any price the flesh of animals that were feverish from injuries received during transportation or from any other causes. In other words, the people of this country demand good meat from perfectly sound animals, and they would not tolerate the sale of meats from animals affected with even noncommunicable maladies.

In most, if not all, European countries inspectors, according to their reports, freely pass for consumption the meat of animals affected with foot-and-mouth disease, pleuro-pneumonia, localized tuberculosis, actinomycosis, and similar diseases which, according to the views and customs of this country, must be condemned. But all the meat for the foreign market is inspected the same as that designed for home consumption, and consequently has been much more rigorously dealt with than is the meat produced in the countries to which it is shipped. In this respect, as in others, we have met the objections which have been raised to American products, and have not only removed the cause, but have gone beyond what was asked by our critics.

The meat-inspection law has been to a certain extent misunderstood by people who apparently have not taken into account the peculiar features of our form of government, and who have thought that this Department should have been given specific authority to destroy the carcasses of condemned animals. While such an opinion is gratifying when coming from our own citizens in so far as it demonstrates their interest in a strict enforcement of the law, it seems to have been the conclusion of Congress that such action is beyond the powers of the Federal Government. Being a national law, this is looked upon as a measure for the regulation of interstate and foreign commerce, but not a local police regulation. It provides the means of guaranteeing the wholesomeness of meats shipped from one State to another or to foreign countries, but it does not provide a guaranty as to the condition of all animals slaughtered for local consumption, since the meat from them is in no sense an article of interstate commerce. It is therefore, under the law, the duty, as heretofore, of State and municipal authorities to inspect meat for local consumption and to deal with that which is condemned by the national inspectors as improper for shipment to other States. Nevertheless, in order to prevent any possible cause for objection to the system, this Department has required an agreement to be signed before inspection was commenced at any packing house to the effect that all condemned carcasses should be sent to the rendering tanks, where they are manufactured into fertilizers.

A system of inspection for all articles of food is extremely desirable, and this should, where possible, be conducted by local authorities. This is particularly necessary in the case of milk, which is liable to contain the germs of tuberculosis, and possibly of other diseases. To obviate the danger from this article of food, the dairies should be kept under strict supervision by the local sanitary authorities, aided by the National Government in cases where the dairy is not in the same State

as the consumer, and is, for that reason, beyond the jurisdiction of the local officers who are interested in its wholesomeness.

In connection with the financial side of our inspection work, it is desirable to compare the advantage gained with the cost of the work undertaken. I will not, at this point, go into details, which will be found in the more extended report on the work of the Bureau of Animal Industry under that head. I will simply state here the fact that, short as the time is since the inspection was established, I find the expense to be less than was anticipated, and to have been rapidly reduced, as might have been expected, as the work has been extended. While in the aggregate it will amount to a considerable sum, requiring a largely increased appropriation for the work of the Bureau, it will, I am sure, be less than most people would naturally expect in view of the enormous amount of work involved. As to the advantage gained, it can only be justly estimated by tracing the development of our foreign trade in animal products, especially in pork, during the ten years prior to the date when the prohibition on these products was enforced by European countries; and comparing that with the development during the past ten years while the prohibition was in force, the inference is a natural and perfectly just one, that without such obstacles in the way of this trade, its growth during the ten years just elapsed would have continued on the same scale as for the ten years previous.

A presentation of these figures shows, referring only to our pork products, that of these there was exported in 1871, \$12,429,000, a sum which had increased in 1881 to over \$69,000,000, exclusive of lard, which is not taken into account, as it has never been included in the prohibition. Instead of an increase since 1881 up to the present time, we find a great reduction, the exports for the fiscal year ending in 1891 aggregating but \$50,494,375. It is a natural inference that the prohibition against these products by European countries caused our pork raisers last year a loss of foreign trade of about \$20,000,000. As against the annual expenditure then for meat inspection, it is reasonable to expect a gain in trade at least equal to the annual loss imposed upon our pork raisers during the past ten years by the prohibition which efficient meat inspection can alone remove, and which for the whole ten years will aggregate over \$260,000,000.

The condition of our live cattle and meat products is so satisfactory as to make all existing restrictions, such, for instance, as that imposed on our live cattle by the British Government, a grave injustice, working a grievous loss yearly to the agricultural classes in this country. We have a system of inspection of every live animal coming into this country, which, in addition to the absolute control exercised by this Department over communicable animal diseases in this country, enables us to offer the most perfect guaranty against the transmission of communicable diseases of cattle to other countries through the shipment of cattle from the United States. We have shown in all respects a will-

ingness to undertake any responsibility and to enforce any regulation of a reasonable nature which the prejudices or experiences of foreign countries suggested, and, as has already been explained, we are, in the matter of inspection, more rigid and thorough than our friends on the other side of the water. The complaints of ill treatment of animals on board ship have been met by the passage of a special law authorizing the officers of this Department to inspect every vessel loading cattle in American ports, and to enforce such regulations as in the opinion of the Secretary of Agriculture are essential to the proper care and good treatment of the cattle in transit.

As regards the possibility of danger to cattle abroad from Texas fever, while the increased powers which I shall ask for for the regulation of the Southern cattle trade in this country will, I am convinced, enable me to prevent any cases of Texas fever among cattle shipped abroad, still, it should be remembered that there is no possibility of this disease being conveyed to foreign countries, it being well known that while Southern cattle communicate the disease to Northern animals, these latter do not further spread the disease. We have convinced every reasonable man in Great Britain, as the result of the double check established by me something over a year ago, by which every animal shipped across the water is tagged and numbered so that it can be identified and its antecedents and history traced on this side, and by which it is duly inspected on arrival in Great Britain by inspectors detailed for that purpose from the force of the Bureau, that there is not an iota of danger to British cattle from contagious pleuropneumonia attributable to our live cattle exported. But three allegations of cases of this disease among American cattle landed in Great Britain have been cited by the British authorities, each of which was disputed by our American inspectors, and in only two cases of them did the British authorities adhere with some firmness to their diagnosis. Thanks to our system of identification, these two cases were traced in the manner I have indicated, and in every particular their life history sustained the diagnosis of our inspectors, which was, I should say, supported by many of the leading veterinarians in Great Britain at the time.

More recently, I am pleased to say, confirmation of our position in these cases, furnishing a triumphant vindication of our American inspectors, has been offered through the columns of a leading veterinary journal in Great Britain by the man who stands beyond dispute at the head of the veterinary profession in that country, and who confirms in the strongest manner our contention of the occasional existence of a disease of a pneumonic, but noncontagious, character among our cattle shipped abroad, as the result of exposure from a transatlantic journey in the winter, and he furthermore shows that in analogous cases among cattle landed in France and investigated by the leading French veterinarians our position was sustained and the disease pronounced

noncontagious, even without the intervention of an American inspector. These facts, in my opinion, would amply justify this Government in making to the British Government the strongest presentation of the grievance which our cattle-raisers suffer unjustly at their hands, by reason of the arbitrary regulations enforced against our American cattle in British ports owing to an alleged dread of contagious diseases, coupled with an urgent demand for the removal of obstacles which we have clearly shown to be useless, and the maintenance of which can only be regarded as an evidence of unfriendliness. Justice as well as proper self-respect demand such a course.

Unless we can secure from the British Government the removal of the unfriendly restrictions now bearing so hardly upon our cattle trade, I shall feel it to be my duty to suggest the rigid enforcement of the law now in existence prohibiting the import into the United States of all live animals, a law which has only been suspended as a matter of friendship to foreign governments. That we have far more justification for the exclusion from the United States of all animals coming from Great Britain and its dependencies than they have for the interposition of any obstacles to our cattle exports from the United States, is shown by the recent report of Prof. Brown, the veterinarian of the British Privy Council, who admits in the plainest manner that no hopes exist in that country of ever absolutely suppressing pleuro-pneumonia, and shows, indeed, that such measurable success as he has faint hopes of attaining in the control of it is to be obtained only by methods which are nothing more than those adopted by ourselves and to which, promptly and vigorously enforced, we owe our present success in the complete control of this disease.

MARKETS FOR AMERICAN FARM PRODUCTS.

Already those laws under which you have been able to enlarge so wisely the channels of foreign trade as the result of reciprocal concession hold out to American agriculture hopes for such a demand for our agricultural products as would have been deemed but a few years since absolutely chimerical. Recognizing the importance of these measures and the extent of the opportunity thus afforded us, I have already sought to furnish the country with the fullest information obtainable in regard to the agricultural resources of other countries and the probable character of the demand which it may be in our power to supply. My facilities for carrying on this work, based on appropriations estimated for when comparatively little opportunity existed for the furtherance of such plans, have been necessarily inadequate, but the necessity of extending work in that direction is so obvious, and the advantages to be obtained by its maintenance and development so great, that I feel confident of encouragement in the way of liberal appropriations for carrying on all the work which I have planned for this Department in the development of our markets abroad.

In furthering the interests of our agricultural products in foreign countries it is especially desirable to propagate by every legitimate means a knowledge among the peoples of foreign countries of our own resources and our own facilities for supplying their wants. Our largely increased facilities in the way of transportation must be accompanied by a freer intercourse, which will teach them the value of our products for their own wants. It will not do for us to overlook the fact that in every foreign country to which we look for the disposal of some of our surplus products we will necessarily meet with a class or classes whose interests will clash, or seem to clash, with ours. In cases where this is only imaginary, the imagined obstacles can only be done away with through a better knowledge among those people of the conditions of agriculture among us, while in the cases where a real competition exists we shall find ourselves obliged to combat not only legitimate competition, but an antagonism which will seek to create prejudice in the minds of consumers against American food products. This can be met only by addressing ourselves directly to the consumers in these foreign countries, whose real interest lies in obtaining desirable supplies of a satisfactory character and at reasonable prices. When once we succeed in inspiring the majority of consumers in any country with confidence in the character of our products and to convince them of the availability for their use of what we have to sell, the antagonism of a single class in a community will be unable to successfully oppose our efforts for a share of their trade. A striking example of the benefit of adequate representation abroad in the interest of agriculture is afforded by the work of our American inspectors of live stock in Great Britain, to which reference has already been made.

CORN IN EUROPE.

A further example of this kind has been furnished by the intelligent and earnest work of the special agent whom I appointed something over a year ago for the purpose of introducing our corn products to the attention of the people of Europe as a nutritious and economical substitute for other cereal foods. The disposal of this, one of our largest crops, abroad has been fitful, being utilized by foreigners almost exclusively as a cattle food, and its extent consequently depending not so much upon any demand abroad as upon its cheapness with us. Hence in years of large production, while the amount exported has shown an increase, it has been at prices inadequate to insure a profit to the producer, while a rise in price, consequent upon a small crop, has always greatly reduced the exports. The efforts of our special agent have been devoted to an attempt to disseminate as widely as possible a knowledge of the various preparations from Indian corn, so popular in this country as human food, and adapted, as all Americans well know, to provide a cheap and inexpensive diet for the poor, as well as to furnish the table of the rich with many delicate and palatable dishes. In

this he has been, in my opinion, rarely successful. It is true that his work has been, until recently, principally confined to Great Britain, in which country he has been greatly aided by the existence in almost every town of any consequence of cooking schools, whose teachers have shown themselves most ready to receive his instructions and adopt his suggestions. Charitable societies and boards intrusted with the care of public institutions have also greatly assisted him in his work.

A report of his work in Great Britain has been received, and will be shortly published, together with a chapter prepared by the chemist of the Department on the chemical composition of corn and its value for food purposes by comparison with other cereals, and also a statistical chapter giving the figures of our corn area and product for a series of years, with prices, proportion exported, etc. This work has attracted much attention in this country, and many of our influential citizens have shown a disposition to further his efforts by all legitimate means, while one of our public-spirited German-American citizens proposes to establish in Berlin, for the benefit and instruction of his countrymen in the uses of Indian corn and its preparations, a practical school of instruction, or corn kitchen. Some time ago, when it became apparent that there was a considerable shortage in the rye crop of Europe, I sent our agent, Col. Murphy, to Berlin with instructions to visit not only Germany, but other countries as well, in which an opportunity existed for his work, for the purpose of taking advantage of the short rye crop and the high prices of other grains, to introduce to the attention of the people on the Continent the availability of corn meal and other corn preparations as a substitute, or at least an adjunct to the wheat and rye foods common among them. He has already succeeded in calling the attention of the German Government to the availability of this cereal as a part of the army rations, it having been found that an excellent mixed bread of rye and corn can be made far more cheaply than bread from rye alone.

DISPOSAL OF SURPLUS CROPS.

It is not to be inferred that because I lay such stress upon the extension of the market for our agricultural products abroad, I overlook the fact that our exports of agricultural products, large as they are, form but a comparatively small percentage of the total crop. This I fully appreciate, and that portion of this report devoted to a general review of the work of this Department in our own country will furnish sufficient proof of this fact; but I realize also that, with our marvelous facilities in the way of agricultural production and our wonderful diversity of soil and climate, and the extent of our territory, we must for many years expect to raise a surplus of many kinds of crops, and in most cases the profitable disposal of this surplus means not only the maintenance of a balance of trade in our favor and many millions of dollars paid to our farmers by foreign consumers, but it must always have a sensible effect

in maintaining remunerative prices for the large proportion of the crop consumed at home.

THE MIDDLEMAN.

In considering the wants of our farmers in relation to the home market, the opportunities for extended observation in relation to prices of agricultural products which the duties of my present position afford me have confirmed me in the strongest manner in my previously-formed impressions in regard to the excessive difference between the prices paid for agricultural products in the market by the consumer and those paid on the farm to the producer. This is a serious evil, enhancing the cost of living to our people, while it depreciates the value of our crops to the farmers. A large share of this difference in price is to be attributed to the handling of the product from the time it leaves the farm until it is delivered to the consumer. The condition of our farmers living in the country away from a market center and obliged often to spend an entire day in order to deliver one load of produce at the nearest market or station, and the general tendency of our people to transact business in the quickest way possible, gives to the middleman a prominence and an influence greater than he probably possesses in any other country.

To provide an adequate remedy for this evil is not an easy task, but there is one thing which can be done for the benefit of both producer and consumer, and this duty clearly devolves upon this Department. It is, to keep the public thoroughly informed on the matter of prices of all important farm products. Doing business daily at a market center, he knows just what prices he can obtain, and his only rule in purchasing, namely, to get the goods he deals in as much below that price as possible, is greatly subserved when he deals with a seller ignorant of the true value of his goods. My earnest efforts have been directed to placing promptly in the farmer's hands the fullest information in regard to the market values of his wares, which will at least save him from the penalty of ignorance and the unscrupulous greed of traders. To extend this work until every farmer in the country may know before he markets his goods just what their value is in the nearest market, is my earnest desire and intention.

DIVERSIFICATION OF CROPS.

In regard to our home market, our chief dependence for its development beyond present limits must be, as I have previously taken occasion to state, in such a diversification of our agricultural products as will enable the American farmer to supplant the foreign one in supplying a large proportion of the agricultural products which we now import. In reviewing the agricultural imports of the past ten months, and noting with satisfaction the effect upon some of them of our present tariff law, it was, nevertheless, strikingly apparent that many

of the agricultural products imported were of a character which could be, and should be, produced in this country.

HOME-GROWN SUGAR.

With regard to the most important of these—sugar—the efforts of this Département afford much encouragement for a home-grown sugar product. The results of the work of the experiment station established in the interest of beet sugar may be regarded as eminently satisfactory, and with regard to sorghum I am happy to be able to state that the process known as the alcohol process, perfected in the chemical laboratory of this Department last year, has, on being tested in the practical manufacture of sugar, answered all reasonable expectations. It is found to so greatly facilitate the extraction of the sugar from the cane as to practically double the yield obtainable by the methods heretofore employed, and this at an increase of cost so trifling as to be practically insignificant. There seems to be no reason why we should not, therefore, look forward with confidence to the day when the one hundred millions of dollars paid by Americans to foreign sugar producers should be turned into the pockets of our own people.

TRANSFER OF THE WEATHER BUREAU.

In all efforts toward diversification in our home-grown products, climatic conditions must be well understood and considered, and in this connection the importance and value to the agricultural interests of the control by this Department of the Weather Bureau can not be exaggerated. On the 1st of October I called upon the Chief of the Weather Bureau, appointed by you July 1, for a special report covering the first three months of his administration of the office, in order that the public might understand the trend of the plans upon which we have agreed for the purpose of enlarging and extending the work of the Bureau, especially in aid of our agricultural interests. Such a report was duly prepared and is now in print, and while the time has been too short to speak of tangible results, the report, nevertheless, shows very clearly the extension of the work in the direction indicated. It is further to be noted with gratification that the transfer of the Bureau to this Department has been generally received with great satisfaction. There has been a truly remarkable development of interest in the work of the Bureau, resulting in a great increase of stations—from 600 to 1,200—as well as of voluntary observers throughout the country, these numbering 2,200, an increase in three months of 400.

At the recent meeting of the Association of American Agricultural Colleges and Experiment Stations, Prof. Harrington bespoke their coöperation in meteorological work, and his suggestion, I am glad to say, was met with a hearty and prompt response, resolutions being adopted expressive of the sense of the association that every college and station should coöperate in the work, and that the closest relation

should be established between the Weather Bureau and such institutions. I take this opportunity to congratulate you upon the selection made for the important post of Chief of the Weather Bureau, and to express my appreciation of the earnest manner in which Prof. Harrington is laboring for the improvement of the service in perfect sympathy with the lines suggested by me in my last Annual Report.

FARMERS AND THE DEPARTMENT.

The demand which exists for more frequent and intimate intercourse between the farmers and the Department can not be met altogether by the issue of bulletins. The printed document, however valuable, may be interesting and instructive, but can never take the place of personal contact. The intercourse between the Department and the farmers should be reciprocal and not one-sided, and such an intercourse can only be cultivated by the frequent participation of representatives of the Department in the meetings of the numerous agricultural societies and farming associations, at which the farmers themselves are present to discuss the means necessary for the improvement of agriculture. I am happy to say that the need for closer relations of this character seems to be appreciated quite as much by the farmers as by myself, as the increased demands for the representation of the Department at meetings of that description amply testify; indeed, they far exceed my ability to comply with them. I trust that in the near future my facilities in this respect may be greatly enlarged. The general and growing interest shown by all classes in this country in the cause of agriculture and in the work of this Department is becoming daily more manifest. It is seen in the attention devoted to the work of this Department by the public press, including many of the leading magazines of the country, to whose pages a few years ago the subject of agriculture was practically an entire stranger. It is to my mind a most hopeful sign that the minds of Americans generally, especially of those who are devoted to other pursuits, should be inclined to give to agriculture the attention it deserves, and to acquaint themselves with its needs and condition. In connection with this subject I desire to call attention to the interesting series of meetings of various scientific associations in Washington this past summer.

IMPORTANT MEETINGS.

During the months of August and September there were convened in the city of Washington ten scientific associations, in whose work this Department has a large interest, viz: The American Microscopical Society, the Association of American Agricultural Colleges and Experiment Stations, the Association of Official Agricultural Chemists, the Society for the Promotion of Agricultural Science, the Conference of American Chemists, the Association of Economic Entomologists, the American Association for the Advancement of Science, the Geological

Society of America, the International Congress of Geologists, and the American Pomological Society.

Never before in the history of the United States has there been such a convention of scientific students in any one place. Their researches cover almost every phase of scientific inquiry and are full of practical results in almost every branch of domestic economy and human industry, while, as the names of many of them indicate, a large majority of them are devoted especially to the consideration of subjects entering directly into the domain of practical agriculture, and in every one of them, I am gratified to be able to state, questions of vital interest to agriculture received ample consideration. As a natural consequence, the scientific force of the Department had occasion to participate, in some cases largely, in the deliberations of these important associations, and to enjoy the inestimable advantage of personally meeting and conversing on subjects related to their own work with the leaders of scientific thought and research in the country. Moreover, I was especially gratified over the fact that at these gatherings the representatives of the Department were treated with a consideration that fully indicates the appreciation in which the work of this Department is held by the scientific world. In this connection it is proper to acknowledge the great value to agriculture of the six lectures delivered at that time by Mr. R. Warington, F. C. S., before the Association of American Agricultural Colleges and Experiment Stations, as the representative of the agricultural experiments of Lawes and Gilbert, at Rothamsted, England. Mr. Warington was the first representative of Rothamsted under the new trust of Sir John Bennet Lawes to Rothamsted, which provides that a representative shall visit America every three years as an exponent of Rothamsted and its work. Mr. Warington met a most cordial welcome, not only from this Department, but from all the leading agricultural scientists in attendance upon the meetings of the association. The lectures were of such high merit that I have authorized their publication by this Department as a portion of the proceedings of the association.

COÖPERATIVE WORK.

Before leaving this subject I desire to express my conviction of the necessity for a closer coöperation between the various educational forces which already exist in this country for the advancement of practical agriculture. The thread which connects this Department with the agricultural colleges and stations, themselves to-day recipients of the national bounty to the extent of considerably over a million and a half dollars annually, is a very slight one. It seems to me desirable that, without in any way limiting the independent action of these several State institutions, the connection should nevertheless be greatly strengthened. These institutions have themselves felt the need for coöperation, and deserve the credit for being the first to adopt some systematic method of attaining it, but this effort is limited to them-

selves. In addition to these institutions we have some individual, or board of individuals, representing in a special manner the agricultural interests of the State, and we have, moreover, State and national societies devoted to the improvement of stock, to the interests of horticulture, dairying, and other specialties in the line of practical agriculture, together with the institutes established and endowed by law in several States. The efforts of this Department will be directed to an extension of some system of coöperation between these various forces by which each in its proper sphere may work to the best advantage, and each be enabled to derive practical aid and benefit from the others.

INTERNATIONAL ASSOCIATIONS.

Three meetings having close relations to agricultural interests have also been held in Europe during the past summer, and in accordance with the earnest desire expressed to you in my last report, that the United States should be represented at such international gatherings, I designated Dr. D. E. Salmon, Chief of the Bureau of Animal Industry, to represent this Department at two of them, namely, the International Congress of Hygiene and Demography held in London, August 10-17, and the International Congress of Agriculture, held at The Hague, September 7-12. The selection of Dr. Salmon to represent this Department at the first named was due to the fact that the Congress devoted a large part of its attention to the relations of the diseases of animals to those of man, one section being assigned exclusively to the consideration of this important subject.

It gratifies me to be able to inform you that our representative was received at the Congress with every mark of consideration, he having been elected an honorary vice-president of the section referred to on receipt of my advice of his appointment, and before he had even presented his credentials. He was also made a member of the foreign council of the section. His being in Europe, together with the fact that two of the important sections of the International Congress at The Hague, the third and the sixth, were devoted to subjects which, in this country, are assigned especially to the Bureau of Animal Industry, determined his appointment as a representative of this Department at The Hague Congress also. The same flattering evidences of consideration were accorded to him as a representative of this Department at that Congress, of which he was elected first vice-president, a distinction especially honorable in view of the fact that he was, I regret to say, the only representative from this country. I am satisfied that his presence there was in many respects most advantageous to our interests. The mere fact that he would be brought into personal contact at these gatherings with men who, in the several countries of Europe, are called upon to act as the scientific advisers of their respective governments in matters relating to agriculture, and especially in such matters as legislation against contagious diseases, inspection of food products, etc.,

would, of itself, in my opinion, amply justify his mission; indeed, I might say it was essential to our interests that he should be there.

The third association referred to above was the International Meeting of Meteorologists held at Munich August 11, at which this Department was represented by Prof. Mark W. Harrington, Chief of the Weather Bureau, and Prof. Cleveland Abbe, one of his chief assistants. In the annual report of this Department, which will go to press before the close of the year, I hope to include valuable reports in reference to all these meetings. I may say now, however, that this year's experience, and the practical effort made to secure adequate representation at meetings of this description of an international character, absolutely confirm me in my convictions already expressed to you, of the necessity of ample and intelligent representation of American agriculture on these occasions. I understand that the next meetings of these associations (they occurring biennially) will fall in 1893, and I regret that no one was authorized to extend to them an invitation to select this country as the place and the Columbian Fair as the occasion for their next meeting. I understand that there was an evident feeling at these gatherings in favor of meeting in 1893 in this country, and, further, that the decision of this question was left to the permanent executive committee. It is possible, therefore, that steps might still be taken to accomplish this end.

BUREAU OF ANIMAL INDUSTRY.

The passage by Congress of the act providing for the inspection of live stock and their products, approved March 3, 1891, and the act providing for the inspection of vessels carrying export cattle, approved March 3, 1891, has so increased the work of this Bureau that I found it absolutely necessary to divide it into four divisions, viz, the Division of Inspection, the Division of Animal Pathology, the Division of Field Investigations and Miscellaneous Work, and the Division of Quarantine.

To the Inspection Division was assigned work largely of an executive character, which covers the eradication of contagious diseases, the inspection of export and import animals, meat inspection, vessel inspection, and the regulation of the movement of Southern cattle.

ERADICATION OF PLEURO-PNEUMONIA.

At the time of my last report contagious pleuro-pneumonia existed in two districts in the United States, viz, on Long Island, State of New York, and in the county of Hudson, State of New Jersey. During the present calendar year but four herds have been found infected with this disease on Long Island, the last herd having been discovered and slaughtered on April 30, 1891. Six months have therefore elapsed since the finding of any cases of the disease in this district, and I am

satisfied that our efforts there in extirpating contagious pleuro-pneumonia have proved successful.

There still remains a small district in the State of New Jersey from which the infection has not been completely eradicated. The work there, however, is being pressed forward with the greatest possible energy, and I confidently expect that before the end of the present fiscal year I shall be able to announce the complete eradication of this virulent and destructive disease from the United States.

With only one small district infected, with this territory in strict quarantine, and with all herds promptly slaughtered when disease is discovered, there is no longer justification for any restriction whatever by the government of any country against the importation of cattle from this country.

INSPECTION OF EXPORT ANIMALS.

The inspection, by American veterinarians, of our cattle landed at the foreign-animals wharves in Great Britain has been continued during the present year with the most gratifying results. The total number of animals inspected by them from the time they began their work to September 19 of the present year was 374,415 head of cattle and 10,959 head of sheep.

The inspection of export animals in the United States has also been continued since my last report under the provisions of the act of Congress of August 30, 1890, and covers the inspection of animals at interior stockyards, the tagging of animals at these points with numbered metal tags, and the obtaining of a history of the animals at the time of tagging, the reinspection of these animals en route and at the port of export, and the loading of the same on board vessels. Since the commencement of this work 311,146 cattle and 15,373 sheep have been inspected, as provided by our regulations, up to October 1, 1891, making a total of 326,519 head of animals inspected.

Of these numbers—

	Cattle.	Sheep.
Great Britain received.....	300, 862	13, 714
Germany received	4, 354	
France received	4, 336	1, 576
Belgium received	1, 594	
Australia received		42
Cape Colony received		41
	<hr/> 311, 146	<hr/> 15, 373

The exports of cattle for the fiscal year ending June 30, 1891, show a decrease of $3\frac{3}{4}$ per cent compared with the exports for the fiscal year ending June 30, 1890. The total exports for 1891 amounted to 362,402, as against 372,690 for the preceding fiscal year. The cause for this decrease in exports is undoubtedly due to the increase in prices of cattle in this country during the latter part of the fiscal year; cattle bringing

in June, 1891, from \$1.25 to \$1.50 per 100 pounds more than in June, 1890.

The excellent impression which our cattle have made in Germany is shown by the following extract from an article which appeared in the German Agricultural Press (*Deutsche Landwirtschaftliche Presse*), Berlin:

On July 20, 139 head of cattle from the United States arrived at Hamburg; most of them oxen. On August 1 a similar shipment arrived, and on August 3 the steamer *Sorrento* landed 240 head; after a thorough inspection the cattle found ready buyers, and were mostly sold to butchers in Hamburg and Altona. They were killed after they had undergone another careful inspection in the public slaughter-houses. The quality of the cattle was excellent; all of them were young and well fed, and they had suffered but little during the time of transportation. It therefore can not be surprising that the prejudice that existed against American cattle by the butchers in Germany is gradually disappearing, and American cattle are preferred. The meat is excellent, as may be expected of cattle that were raised on the meadows. Bulls are less in demand.

The cattle show that the Americans take great pains in raising good stock, and it seems that the high prices they give in England for the best stock of cattle for breeding purposes repay them well. The most of these cattle are Shorthorns, some Scotch "Angus," and also Devonshire and Herefordshire; in short, those kinds of cattle which we see at the large cattle shows in England.

In comparison with the German cattle, it seems that the Americans succeed in giving their cattle a broader and deeper front, deeper and more complete hind-quarters, as well as a strong and straight back; in one word, the cattle have a fine appearance and make a favorable impression. The head is well and nobly shaped, but the horns, which are an ornament to the cattle, are mostly cut off. This seems to be a widespread practice in America, and that cruel operation generally takes place before the cattle are one year old, so that when the cattle are two or three years old one can hardly recognize even a stump of the horns. No doubt it is an advantage when cattle are to be shipped and many of them are loose in one compartment.

Whether the import of cattle from America will reach large dimensions remains to be seen, but it deserves the closest attention of our agriculturists and stock-raisers.

What the extent of the importation of cattle from America may be is seen by the export to England, where during last year in Deptford alone about 300,000 head of cattle were landed from the United States.

INSPECTION OF IMPORTED ANIMALS.

The act of August 30, 1890, provides for the inspection of all imported cattle, sheep, and swine arriving in the United States. This work was inaugurated by the Department immediately after the passage of the act, and has been continued in accordance with our regulations. Inspection stations have been established along the Canadian border, and three quarantine stations are maintained along the Atlantic seaboard. At the beginning of this work stations were established along the Mexican border, but since the increase in tariff duties on imported animals no importations of cattle, sheep, or swine were made into this country from Mexico, and for this reason these stations were discon-

tinued. The total number of animals inspected since the commencement of this work, imported at our Canadian stations, was 2,456 cattle, 129,390 sheep, and 54 swine. Of this number 169 cattle, 2,680 sheep, and 54 swine were imported for breeding purposes. At the quarantine stations on the Atlantic seaboard there were imported and quarantined for ninety days 46 cattle, imported for breeding purposes, and 1,698 sheep, and 70 swine, quarantined for fifteen days.

Owing to the failure of the Dominion of Canada to provide for the quarantine of sheep arriving in that country from countries infected with foot and mouth disease, I found it necessary, on the 19th of May, 1891, to order the quarantine of all sheep and swine imported from Canada into the United States for a period of fifteen days. Sometime thereafter, by order of council, a quarantine of fifteen days was established on all sheep and swine imported into Canada from Great Britain or the continent of Europe, and consequently, on June 25, 1891, I rescinded my order above referred to.

The only contagious disease found among imported animals at our quarantine stations during the past year was among a shipment of twenty-two Southdown sheep from England which entered at our quarantine station at Garfield, N. J., in which shipment were eleven animals affected with foot rot. This shipment was detained in quarantine until this disease had entirely disappeared. The only other instance of disease occurred in a shipment of sheep from Canada, imported at Island Pond, Vt., in which were found five cases of foot rot out of a shipment of 102 head. These were handled in the same manner as the sheep found diseased at Garfield.

VESSEL INSPECTION.

Under the act of March 3, 1891, this Department was empowered to regulate the fittings of vessels carrying export cattle from this country to foreign nations, and on June 6, 1891, I made such regulations as in my judgment would promote the better carrying of cattle, the more humane treatment of the same, and insure their arrival in better condition at their points of destination. I am happy to say that the various steamship companies engaged in this traffic have very cheerfully accepted these regulations, and, at considerable expense, have remodeled their vessels so as to comply therewith. The result, so far, of the vessel inspection regulations has been to materially reduce the losses resulting from lack of ventilation, overcrowding, and weak fittings. The carrying trade has thus been greatly benefited by these regulations, and hereafter losses from the causes just mentioned will be reduced to a minimum, and the objections to the transatlantic trade in live cattle entirely overcome. The total number of vessels examined since July 1, 1891, has been 215; 98 sailed from the port of New York; 52 from Boston; 42 from Baltimore; 15 from Philadelphia, and 8 from Newport News.

MOVEMENT OF SOUTHERN CATTLE.

The mildness of last winter made it necessary to undertake the control of Southern cattle coming to Northern markets at an earlier period than for the preceding year, and on February 5, 1891, I issued the necessary order regulating the movement of cattle in this branch of our interstate commerce. The quarantine line of the present year was extended from the Mississippi River east to the Atlantic Ocean, conforming as nearly as possible to the line of permanent infection by this disease established as a result of the investigations published in the report of the Bureau of Animal Industry for the year 1884.

Some idea of the amount of work done by the Bureau in supervising the movement of Southern cattle may be had from the fact that the total number of carloads of cattle which were separated and kept distinct in course of transportation amounted to 40,542, containing 1,051,626 head of Southern cattle.

It was not possible during the present season to maintain as rigid an inspection of the work of disinfecting cars, performed by the railroad companies, as was necessary to insure absolute safety in this traffic. The Department was compelled, in a measure, to rely upon the railroad companies for the observance of this part of the regulations, and for the thoroughness of the work. While a large number of the railroad companies cheerfully complied with the regulations and endeavored to carry them out thoroughly, I regret to say that others were careless in attending to this matter. The consequence, therefore, has been that while the outbreaks of Texas fever or Southern fever have been greatly diminished during the present season, they have still occurred in some parts of the country, and a few cases of the disease have been found among export cattle.

I have, therefore, to renew the recommendation made in my last report, that legislation be asked of Congress which will render possible the strict enforcement of the regulations for cleaning and disinfecting cars that have carried infected cattle. At present there is no penalty or provision of law by which railroad companies can be held to a strict compliance with this rule, and the only means at the disposal of the Department for securing this is to refuse to certify export cattle for clearance in cases where the regulations are disregarded. If the country is to be kept free from this disease it is necessary that specific power should be given this Department which will enable it to secure obedience to these regulations by all common carriers, whether they are interested or not in the export trade.

MEAT INSPECTION.

In prescribing regulations for meat inspection under the act of March 3, 1891, I made provision for a microscopic examination of hogs at the time of slaughter in order to certify that the same were free from the

animal parasite called *trichinæ spiralis*. In addition to the provisions for microscopic inspection of pork, the regulations provided for an examination, before and after slaughter, by veterinary surgeons, of all animals slaughtered for export or interstate trade, the condemnation of animals found to be diseased, and the proper identification of the carcasses and other products which enter into these two classes of our commerce.

Meat inspection was instituted under these regulations on May 12, 1891, in New York, N. Y., and was confined to the inspection of export dressed beef. At the beginning of June, 1891, this work was inaugurated in Chicago, and immediately thereafter at South Omaha, Kansas City, Jersey City, and Hammond, Ind. Microscopic examination of hogs was commenced in Chicago on June 22, 1891, and later at Milwaukee, Omaha, Kansas City, and Boston. From the beginning of this work to the 1st day of October, 1891, there have been a total of 1,016,614 animals inspected both before and after slaughter. Of this number 844,581 were cattle, 15,330 calves, 93,331 sheep, and 63,372 hogs. There were 373,149 quarters of dressed beef tagged for export and 2,009,462 for interstate trade. In addition, 379,872 packages of canned, salted, and smoked meats were stamped in accordance with the regulations. There were 63,372 carcasses of hogs examined microscopically. The total number of animals condemned and sent to the fertilizing tanks was 1,976.

COST OF THE WORK.

It is exceedingly difficult to estimate the cost of the new branches of work undertaken by the Bureau of Animal Industry during the past year. This difficulty is increased by the fact that the amount of work done each month and the cost of the same fluctuates with the demands of commerce for our cattle and their products.

The work of inspection of export animals provided for by the act of Congress of August 30, 1890, has now been in operation for about ten months. The average cost of this character of work during this period has been at the rate of \$8,500 per month. During certain months it has gone as high as \$10,279 and has fallen as low as \$7,400. As an average, I should estimate that the cost of export-cattle inspection, which covers the work at interior stockyards, tagging, recording, and inspecting at the foreign animal wharves in Great Britain, would be \$100,000 per annum.

The cost of maintaining the supervision of the movement of Southern cattle was at an average expenditure of \$2,275 per month, or for the ten months during which the regulations are enforced \$22,750. If a sufficient number of inspectors are employed to see that all cars are properly disinfected and that the regulations are enforced at all stockyards the annual expenditure will probably reach \$30,000.

The inspection of import animals arriving in the United States from Canada amounts to \$775 per month, or \$9,300 per annum.

The work of meat inspection has only been fairly in operation since the commencement of the present fiscal year. The cost of the inspection of animals and carcasses in this work during the month of July, including the tagging of quarters of dressed beef going into the export and interstate trade and the stamping of packages of canned and salted beef and pork products, amounted to 5.7 cents per head for each animal inspected, making a total, for 195,664 animals in the month of July, of \$11,160.71. This cost was reduced in the month of August to 4.75 cents per head, being a total number of 295,250 animals inspected at a cost of \$13,981.39. A still further reduction in the cost of the work was accomplished during the month of September, when 438,593 animals were inspected at a cost of \$14,200, an average of $3\frac{1}{4}$ cents per head. I am of the opinion that the inspection of animals and their marking for identification may be accomplished for a sum not exceeding 3 cents per head.

The figures given above do not include the cost of the microscopic inspection of hogs. This latter branch of the work has not been in operation long enough to be properly estimated for. It was necessary at first to educate examiners in the performance of their duties, and some little time was required to enable them to become proficient and rapid in their examinations. Another difficulty arose from the fact that several abattoirs which are being supplied with this character of inspection do not keep our examiners supplied with the quota of samples designated in their applications for this inspection. The cost of microscopic inspection during the month of July amounted to $20\frac{1}{3}$ cents per hog. The cost of the same work during the month of August was reduced to $13\frac{1}{3}$ cents per hog. Taking fifty animals as the average examined by each person, the cost of inspection would be about 5 cents per animal.

The demand for this inspection by the various packing and slaughtering establishments throughout the country is on the increase. Twenty-seven establishments are now having their products inspected, and there are a number of other applicants with whose requests I have not been able to comply, as the appropriation for the Bureau of Animal Industry is too small to justify extending this branch of work. I earnestly recommend that Congress be asked to make an appropriation sufficiently large to enable us to extend this inspection to all applicants. Doubtless this branch of work was not considered by Congress at its last session in making the appropriations for the Bureau of Animal Industry, as the bill providing for it was not passed until the closing days of Congress. The benefits which have already accrued by the opening up of the foreign markets to pork products, the increased demand for beef products, and the reestablishment of their reputation for wholesomeness and soundness in the markets of the world, together with the protection which this inspection furnishes to our own consumers, amply justify a liberal appropriation.

DIVISION OF ANIMAL PATHOLOGY.

The Division of Animal Pathology, as at present organized, covers all investigations in regard to the nature, prevention, and treatment of animal diseases. During the summer considerable time had to be spent in fitting up the new laboratory provided for by the last Congress and in transferring apparatus to it. Though experimental work was not stopped at any time, it was more or less interfered with during July and the latter part of August. The new quarters are superior to the old in every particular, and are well provided with apparatus and modern appliances for this class of investigations.

The investigations of Texas fever have been continued during the summer. The results of the experiments confirm the conclusions of 1890, throwing new light upon the nature of the disease and strengthening the hope that its means of transmission will soon be fully understood.

The work on swine diseases has occupied the attention of the division throughout the year. A special report on swine plague was prepared with great care, which gives in detail the work done by the Bureau since 1886 in different parts of the country.

Inoculation as a means of preventing the diseases of animals, the different forms of pneumonia in cattle, and tuberculosis are among the subjects which have been carefully studied.

The investigation of animal parasites is being actively prosecuted with reference to our domesticated animals. These parasites are responsible for a large amount of harm, which is becoming more apparent by patient research. The material for a report on the animal parasites of cattle is now being collected.

Other diseases are being investigated as time and opportunity offer, and valuable work is being done in determining the essential cause of animal plagues.

DIVISION OF FIELD INVESTIGATIONS AND MISCELLANEOUS WORK.

A corps of inspectors is constantly employed in making investigations as to the character, etc., of reported outbreaks of contagious diseases in various States. As an example of the necessity and importance of such work, it may be stated that an unfounded rumor of the existence of foot and mouth disease was recently published in Pennsylvania in spite of the lesson derived from our experience in the West last year. Upon careful examination, however, it was demonstrated, as in the latter case, that this was not foot and mouth disease, nor a contagious disease at all. The contradiction in this case followed the rumor so quickly that it is hoped no evil consequences to our cattle interests will ensue, but such unfounded rumors are as dangerous as they are inexcusable. There has been less disease of all kinds than formerly among our animals, and happily many of the contagious diseases common or occasional in other countries do not exist at all with us.

I take pleasure in calling your attention to the great value of, and unprecedented demand for, the Special Report on Diseases of the Horse, written by the most eminent veterinarians of this country, and issued by my direction. If we may judge by the character of letters received commending this publication, it is within bounds to say that it is worth the entire sum appropriated to the Department of Agriculture.

QUARANTINE DIVISION.

Stations securely inclosed, and provided with suitable sheds, yards, and conveniences for the care of stock, have been maintained for the ports of Boston, New York, and Baltimore. Cattle brought to these ports have been quarantined for a period of ninety days from the date of arrival at the station. Although the number of cattle imported during the year has not been large, the quarantining of them has been a necessary precaution to prevent the possible introduction of contagious diseases from foreign countries. The large expenditures which have been made by this country to exterminate such diseases from its borders have made this precaution of special importance to prevent the possibility of reinfection of the United States. In addition to the quarantine of cattle, a quarantine of fifteen days has been required upon all sheep and swine brought into the United States at these ports. The number of pure-bred sheep imported has been largely increased over that of other years, which makes this precaution of detention under veterinary inspection especially important and desirable.

When the demand for pure-bred animals is in excess of the supply, the tendency of those engaged in the business is to exercise less care to select only healthy animals and guard them against exposure to disease. It becomes purely a business enterprise with a manifest desire to curtail expense without especial regard to the ultimate loss which might result to buyers. The need for careful inspection under Government control is then more apparent. No important cases of disease have developed in either of the quarantine stations, and the vigilance of the officers of this Department has not been relinquished. The uniformly healthy condition of our flocks and herds in America makes it imperative that a strict oversight should be placed over all animals brought from foreign countries to prevent the introduction of such exotic maladies as would devastate an important industry, and lead to great loss.

THE DIVISION OF STATISTICS.

During the past year there has been an effort to give more prominence than usual to original investigation. The routine demands for results in crop-reporting and other lines are always exacting, and the means at hand for collecting special statistics and for compilation and preparation of special reports are limited. A more general and searching survey of the resources and condition of agriculture is necessary to

a proper understanding of its practical and political needs. Such investigation is progressing, and bulletins illustrating these conditions are in preparation. Some will present the status of rural industry in the older States, and others will show the resources and agricultural development of the States of the prairies and the plains.

Graphic illustration of statistics has met with much favor among industrial educators and students of rural economy. The issues of the past years, in this line, amount to 40,000 copies, the distribution having been mainly to farmers' institutes, agricultural and other colleges, and to libraries.

Special investigation is in progress in various lines in Europe for more exact data relative to production and prices of products with which America competes. It is realized by all thoughtful minds that while home consumption requires nine-tenths of our agricultural production, an active demand for any surplus relieves stagnation in the markets and advances prices. As this demand is limited and variable, its stimulation in certain lines is practicable and desirable. An agent is now in Europe laboring zealously against existing prejudice for the substitution of corn for rye, potatoes, and other food of the laboring masses. Much can be done towards enlarging both the quantity and variety of our exports of the products of agriculture, and the first step in this direction must be a more intimate knowledge by our own people of the condition and character of foreign markets. This information it devolves upon this division to provide. Much that is new in this direction is proposed for the statistical service of this Department. An increase in exports of only 10 per cent means an enlargement of the income of our farmers of over \$60,000,000, and a steadying of prices of all that is consumed at home. A few thousands properly expended for such a purpose might add as many millions to the national agricultural income.

Anticipating a favorable result in the effort to extend the trade for our agricultural products in the South American Republics, and realizing that what our people needed in order to enable them to take advantage of such improved conditions of trade as might, through the efforts of this Government, be established with these countries—an anticipation which has, in regard to some of them, been already realized—there has been prepared from time to time in this division, and published in its regular monthly crop report bulletin, a series of articles upon the resources and agricultural conditions of leading countries of South America. As these reports go largely to the same circle of readers, I have directed that the several reviews of the countries of Central and Southern America referred to be republished in a bulletin for general distribution. This will no doubt be ready before the close of the year. The employment of special agents to further investigate this subject, and the character of agricultural products demanded in these countries, the prices obtainable for them, the quality of goods demanded, and, in a general way, the opportunities that exist in this direction, is

much needed, and I trust it will be in my power to carry out such a plan.

Another feature of foreign agriculture which has commanded attention in the work of this division has been what might be called "the political economy of farming," and careful compilations have been made of the coöperative bank and loan systems of several countries, including Russia, France, Germany, Austria-Hungary, and others, in so far as they apply to the farming community. The results of these investigations have also appeared from time to time in the regular monthly crop reports of the division; but it is my intention that they also shall be reprinted in a single bulletin, in which I hope to be able to superadd some of the valuable suggestions available as the result of the deliberations of the International Congress held at The Hague last September. In these days there is no distance limitation to possible competition, and it is incumbent upon the Statistical Division of this Department to investigate the conditions of agriculture throughout the world, for there is no section of the civilized world which may not at some time and in regard to some product be found to be a competitor of the American farmer, nor in which at sometime and for some product the American farmer may not find a possible market.

CHEMICAL DIVISION.

In addition to the routine duties of the division, two main lines of investigation have been followed.

The first line relates to the methods of manufacture of sugar from beets, sugar cane, and sorghum. An experimental station for the production of beets of high saccharine richness has been established in Nebraska, and the results of the first year's work are eminently satisfactory. The beets have yielded over 20 tons of roots per acre, with a sucrose content of about 15 per cent, which is equal to the average content in sugar of the sugar beets of Europe. Scientific methods of culture have been followed, devoted particularly to the purpose of growing mother beets of high saccharine richness for the purpose of producing seed.

In Florida an experimental station has been established for the purpose of investigating the possibilities of the reclaimed muck lands of that State for the growth of sugar cane. The season's work at this station is not yet completed, and therefore no statement of the results can be given.

In Kansas two experimental stations have been conducted, one for the purpose of developing a higher grade of sorghum cane for sugar-making purposes, and the other for the purpose of illustrating the possibilities of the alcohol process for producing sorghum sugar. The work of both of these stations has been attended with great success. Over 150 pounds of sugar per ton of cane have been obtained by the alcohol

process from the first run of the cane through the mill, and it is estimated that at least 50 pounds can be added by the subsequent runs, thereby doubling the product as compared with the old process, and demonstrating that by the use of this process sorghum sugar can be made with the same ease that sugar is made from sugar cane. It is believed that the results of the work of the Chemical Division in this respect will be of such a nature as to encourage capital to investment in sorghum sugar making with the assurance of a profitable return on the money invested, provided the other features relating to geographical limitations, improved varieties, careful culture, and adequate manufacturing facilities, insisted on in my previous reports, be observed.

The second line relates to the continuation of the investigation into the adulteration of food. This work has been confined chiefly, during the past year, to studies of the composition of sugars, molasses, sirups, honeys, and confections; teas, coffees, and chocolates. Samples of these articles of consumption have been purchased in all parts of the United States and submitted to examination for the purpose of detecting the character and extent of the adulteration.

In regard to the sugars no adulteration has been discovered. The cheaper sugars of commerce are boiled in such a way as to incorporate with them a considerable quantity of molasses and water. Some of the low-grade yellow sugars which are sold have been found to contain only about 86 per cent of pure sugar. The presence of water and molasses in the sugar can not be regarded as an adulteration, inasmuch as these are natural constituents of sugar in the raw state. It is simply a question for the buyer to know whether he gets the same amount of saccharine matter by purchasing the low grade of sugar of this kind for a given sum as he would were he to purchase the high grade refined sugar at a higher price.

In regard to molasses and sirups and the liquid honey, however, the large majority of the samples on the market are adulterated with glucose made from maize or potatoes. This adulteration is not generally considered harmful, but so far as used is fraudulent; but another occurring in molasses is certainly deleterious, to wit, the bichloride of tin used in giving a luster to high-grade yellow sugar, which ultimately finds its way into the molasses. In tea the chief adulteration seems to be the admixture of foreign leaves and the refuse of the leaves which have been once exhausted.

The results of the examination of coffee were remarkable and startling. Not only has it been found that a large percentage of the ground coffees of commerce is adulterated with chicory and pea and bean flour and other harmless substances, but it was found that wholly artificial coffee beans have been introduced into the market, many samples of coffee bought on the open market consisting largely of these artificial beans. These beans are made of chicory, pea and bean flour, and caramel, and molded so as to resemble the natural coffee berry. These wholly artificial beans are sold to the trade at 4 cents a pound.

These investigations disclose the fact that in a large measure these fraudulent beans are imported, and I am firmly of the opinion that such importations as well as their manufacture and use in this country should be prohibited by appropriate and stringent legislation.

DIVISION OF ENTOMOLOGY.

Much interest has been occasioned and some alarm felt during the summer by widespread reports of unusual abundance of locusts or grasshoppers, particularly in the Western States. Reports from farmers have come from Michigan, Minnesota, North Dakota, South Dakota, Montana, Wyoming, Idaho, Kansas, Nebraska, Colorado, Texas, New Mexico, and California. In all of these States, except California, a repetition of the locust scourge of 1874 to 1876 was feared. In this emergency active measures were undertaken to arrive at a proper understanding of the true state of affairs. Four special agents qualified for the work were sent into the field, and all of the States mentioned were visited. In all except Minnesota and North Dakota the insects were found to be local species which had from various causes become exceptionally abundant. None of them are greatly to be feared, and all are nonmigratory, except in small degree. The visit of the agent was sufficient in most cases to allay fear for the future. Considerable damage, however, was done in parts of California by the devastating locust, and in North Dakota and Minnesota undoubted specimens of the Rocky Mountain locust (*Caloptenus spretus*) were found, indicating that this notorious insect had migrated in small swarms from its permanent breeding grounds, and justifying some apprehensions as to the prospects for next year.

Anticipating from the records of 1890 an exceptional demand for information on the subject, the Department published early in the spring, under serial number 25, Entomological Division, a bulletin on destructive locusts, summarizing the habits of the principal destructive species and giving at some length an account of the best remedies to be used, particularly against the Rocky Mountain species. The authorities, ably assisted by the farmers, have been carrying on a vigorous warfare on the lines suggested by the bulletin with excellent results, and their crops will, it is hoped, be saved from destruction next year unless the insect has been breeding in numbers across the line in Manitoba and British Columbia. We have the assurance of the Canadian authorities that, so far as they can find, no swarms have been observed in that part of the Dominion. The outlook for the coming season is therefore, on the whole, favorable.

The investigation of the bollworm of cotton mentioned in my last report has been continued through the present season. An agent has been stationed at Shreveport, La., conducting in the main experiments with bacterial and fungus diseases of other caterpillars, with the view

of endeavoring to procure a contagious germ which may be artificially transmitted to the bollworm. His efforts have as yet been rewarded with only partial success, but many facts of scientific value have been brought out. Another agent has been working in Arkansas on different insecticide mixtures for this insect, but the work of the season has been hampered from the fact that the bollworm in that locality has not been numerous.

The entomologist has for some time been endeavoring to introduce some of the European parasites of the Hessian fly. A supply of the Hessian fly infested by the commonest European parasite—*Semiotellus nigripes*—was secured. These were placed in the hands of several agents and correspondents of the Division of Entomology in sections of country infested by the Hessian fly, and directions were given as to the best methods of bringing about the acclimatization of the parasite. One of these experiments has resulted satisfactorily, and the parasite has become established in that vicinity. Practical results of great value are to be anticipated from these experiments. Another experiment in the importation of European parasites has resulted successfully. In 1883 the commonest European parasite of the cabbage worm was brought over in small numbers and established near Washington. A year ago a second lot was imported and placed in the hands of an agent of the division at Ames, Iowa, who reports that this parasite has become very abundant at Ames and has greatly reduced the numbers of the cabbage worms. The same parasite is now reported from a large extent of country.

Early in the summer the hop plant-louse was reported as exceptionally abundant in the hop-growing regions of New York State, and a repetition of the great damage of 1886 was feared. An emergency bulletin was prepared covering the life history of the insect and the best remedies to be used against it, and was distributed about the infested region. Largely, I believe, as a result of this prompt action on the part of the Department, hop-growers were enabled to fight the insect in the most approved manner, and the damage to the crop has been comparatively slight. The bulletin in question was also distributed in Wisconsin and in the hop-growing regions of Oregon and Washington, where the insect first made its appearance two years ago.

The State Board of Horticulture of California, having obtained an appropriation to permit it to make further efforts to secure parasites, by resolution placed the sum at my disposal, with a request to send Mr. Albert Koebele, an agent of the Division of Entomology, who had been so successful in securing the Vedalia ladybird, on another mission to Australia and New Zealand for the purpose of studying and importing into California other insects which might prove of benefit to the horticultural and agricultural interests of that section of our country. This I consented to do, his expenses to be paid by the board and his salary by this Department, with the understanding that he report to the Department. He sailed August 23, 1891.

The gypsy moth, a destructive insect imported from Europe, has invaded the State of Massachusetts, and threatens great injury to many forms of cultivated vegetation, particularly to fruit and shade trees. The Department has been consulted by the State Board of Agriculture, and the entomologist has twice visited the infested region during the season for mutual consideration of the best means for eradicating the pest.

The subject of bee culture has been a particular subject of investigation the present season. A station for experiments has been established in Ingham County, Mich., and a special agent has been appointed and stationed temporarily at Washington to take charge of the work in this direction.

Other investigations of less general importance, having, however, a strong bearing upon the farming interests of restricted localities, have been carried on. The stationary field agents of the division have been industriously at work in their different localities upon injurious insects, with the best of results.

REPORT OF THE BOTANICAL DIVISION.

The work of the division in the line of exploration and survey of the vegetable productions of the country has been extensive. In conjunction with the Division of Economic Ornithology an exploration of the Death Valley in southeastern California was undertaken, beginning about January 1. The object of this expedition was to obtain a complete knowledge of the animal and vegetable life of that desert region, including several mountain ranges which traverse the valley as well as those which form its boundaries, and to mark as completely as possible the limits of the life zones from the lowest to the highest points of the region. Two botanical collectors were constantly in the field for eight months, or until the field work was closed. The plants collected have been received at the office of the division, and are now being carefully and thoroughly investigated. The results of the work will be embodied in a bulletin, which it is believed will be of unusual interest and of great scientific value.

Botanical work has been continued in western Texas, New Mexico, and Arizona with special reference to the grasses and Cactaceæ of that region, with the purpose of supplying greatly needed information on some of the widely diffused and yet little known plants of this region of country.

Botanical investigations and collections have also been made in the Indian Territory, in Nebraska, in northern Wisconsin, and in Minnesota. The collections from these sources have been very satisfactory, have contributed much to our knowledge of the vegetation of those regions, and have added much to the value of the Herbarium. We have also had a botanist in southern Florida, who has investigated the vegetation

of the keys and coast, and has added much to our knowledge of that region.

The Herbarium work during the year has been much enlarged, many thousand specimens have been added to the permanent collection, many thousands have been distributed to the agricultural colleges, and exchanges have been made with many scientific societies, both domestic and foreign.

Several new botanical bulletins have been published, particularly No. 4, of Contributions from the National Herbarium, giving an account of a very interesting collection of Mexican plants; and No. 1 of the second volume, which is the first part of a Manual of the Flora of Texas, which is being prepared as a convenient reference book for botanists and residents of Texas and the adjoining region, a work which is much needed and is highly appreciated. The second part of the illustrated work, called "Grasses of the Southwest," is now in press, and when bound with the first part will make a valuable volume of illustrations of North American grasses.

The experimental grass and forage station which this division has in charge at Garden City, western Kansas, has now been in operation for three years. It was established for the purpose of testing grasses, forage plants, and grains which are best adapted to cultivation in the arid and semiarid districts, and of ascertaining what are the possibilities of agriculture under the conditions there existing. The experiments have been conducted on a large scale and with great care, and the results obtained this year are highly satisfactory, showing that certain varieties of grains, grasses, and forage plants have withstood the aridity of the climate and have produced crops which compare well with those of more eastern and moister regions. These experiments will be continued for a fuller confirmation. It seems to be proven that to secure a good stand of grasses for pasturage a longer time is required than in a moist climate, but that with proper varieties and proper management a good result may be obtained.

So general has been the desire to ascertain the possibilities of grass and forage growth without irrigation, that arrangements have been made with many of the experiment stations in other portions of the arid territory to conduct jointly with this Department a series of experiments in this line. New Mexico, Arizona, Utah, Wyoming, North and South Dakota, and Colorado are the points where these experiments have been instituted.

DIVISION OF ORNITHOLOGY AND MAMMALOLOGY.

During the past year the work of this division has been continued in the directions indicated in my last report, namely, (1) the collection and diffusion of information relating directly to the economic value of mammals and birds; and (2), researches relating to the geographic distribution of species, with special reference to the ascertainment of

the boundaries of the several life zones in the Western States and Territories. A report has been published comprising the results of a biological reconnoissance of Idaho, made in 1890.

The most important work of the year has been a biological survey of parts of southern California and Nevada, known as the Death Valley Expedition, which was in charge of Dr. C. Hart Merriam and Mr. Theodore S. Palmer, the latter being in charge during Dr. Merriam's absence. This expedition was organized for the primary purpose of determining the boundaries of the natural life zones in southern Nevada and southern California, and studying the problems relating to the laws which govern the distribution of life. The northern boundary of the Lower Sonoran Zone was traced by Dr. Merriam in person completely across the southern part of the Great Basin from Owen Valley at the foot of the Sierra Nevada in California to the Santa Clara Valley at the foot of the Great Colorado Plateau in Utah. The determination of this line, never before attempted, is a matter of considerable satisfaction to the Department, inasmuch as it fixes the northern limit of successful raising production and of profitable cultivation of several subtropical fruits.

The area surveyed includes the High Sierra as well as the arid deserts contiguous thereto, and consequently embraces parts of all the life zones known on the continent of North America from the Arctic-Alpine to the Lower Sonoran. The area surveyed comprises about 100,000 square miles situated between the parallels of $34^{\circ} 30'$ and 38° degrees north latitude in southern California and Nevada and a small area in northwestern Arizona and southwestern Utah, thus including all of the torrid desert valleys and basin ranges between the Sierra Nevada and the Colorado Plateau.

Through the coöperation of the Weather Bureau (transferred to the Department of Agriculture July 1) a meteorological station was established in Death Valley in April, where continuous observations have been taken until the present time. A regular station is permanently located at Keeler, on Owen Lake, and another was established near timber line on the High Sierra, so that simultaneous observations have been taken at three distinct points in the area under investigation, thus bringing together a series of thermometric and barometric data which have never before been available in work of this character.

The members of the expedition are scientific experts comprising the best field naturalists in the country in their several special lines of work. By coöperation with the Botanical Division a competent botanist, Mr. F. V. Coville, and a botanical assistant accompanied the expedition and made large collections of the grasses and other plants of the region. By coöperation with the Entomological Division an experienced insect collector, Mr. Albert Koebele, joined the expedition in the Death Valley region early in April and remained a little more than a month.

Incidentally, large collections were made in various departments of natural history, and it is expected that the report of the work of the

expedition will be of more than ordinary scientific as well as practical interest.

In addition to the Death Valley expedition, field work has been conducted in parts of Texas, northern Idaho, and the State of Washington.

SECTION OF ECONOMIC RELATIONS.

The economic work of the division has been carried out mainly along the lines indicated last year. The illustrated bulletin on hawks and owls, described at length in my last report, still remains unpublished through lack of funds to pay for reproducing the colored plates. Meanwhile the text has been revised thoroughly, and considerable new matter has been added. It is believed that most of the material necessary for the completion of the bulletin on crows is at hand, special effort having been made the past spring and summer to procure the stomachs of old and young crows in corn-planting time and during the breeding season of the smaller birds. Only part of the material thus collected has been studied, but the examination of the rest will be completed at once, and the bulletin will be issued as soon thereafter as possible.

Some progress has been made on the other bulletins mentioned in last year's report, particularly on that relating to the crow blackbird. Several hundred stomachs of this species have been added to the collection, and the preliminary examination of most of them has been made.

The reference collection of seeds has been greatly enlarged and its utility correspondingly increased; and a series of slides for the microscope has been prepared showing fragments of the skins and other tissues of carefully identified seeds and fruits, and also fragments of worms, crustaceans, insects, and other invertebrates which are likely to be found in the stomachs of birds.

The routine work of the division is steadily increasing. The number of specimens received for identification is much larger than in previous years, the total number for 1891, including those collected by field parties of the division, exceeding 10,000.

FORESTRY DIVISION.

This division was principally designed to give information upon and to arouse and stimulate interest in forestry matters, hence its labors hitherto have, more than those of other divisions, been of a missionary character.

The wisdom of its institution and the timeliness of its warnings can no longer be doubted, showing as it has the inevitable consequences of an irrational treatment of our forest resources. It has become apparent that there is no such thing as "inexhaustible supplies" when increasing demands of an increasing nation are to be satisfied; it has become also apparent that thousands of acres of good agricultural soil

have annually become barren and waste, and are being washed away, merely through lack of attention to the forest cover and the unwise and improvident removal of the same. Persons in high authority and whose judgments command respect allege that the cause of excessive water conditions in some of our rivers is the denudation of their banks, and recommend as a principal remedy their reforestation. It is claimed that much of the loss by flood which we experience annually could be avoided by a proper attention to our forest cover.

The existence of a Government agency to promulgate sound forestry principles, while the Government itself has made no provisions to apply such principles to its own permanent timber lands is an incongruity that suggests the desirability of further legislation. The power conferred upon the President by the law of March 3, 1891, to establish forest reservations must needs remain largely inoperative as far as maintenance of proper forest conditions is concerned, unless it be followed by the establishment of a proper administration based upon forestry principles. The establishment of permanent reservations of forest lands needful for maintenance of proper water conditions placed under a rational management seems to be a proper forest policy for our immediate future.

Since it has been understood that not only questions of arboriculture and woodcraft, but all those relating to the utilization of the products of our forest, belong within the sphere of this division, since in fact the great lumber and wood-working industry of the country, ranking at least second in value of product, finds in the Forestry Division its first official representation, the demand upon it for information of the most varied kind has increased and makes an increase of its force and an extension of its investigations imperatively necessary, if it is successfully to satisfy the great interests which it is to subserve. A slight increase in the appropriation has enabled the division to enter upon a somewhat more extended line of original research.

The most noteworthy and far-reaching work of this kind inaugurated is the examination and testing of our more important timbers upon the most comprehensive and exhaustive plan ever undertaken in any country except Prussia, where simultaneously a similar line of investigations has been inaugurated. This work has elicited the highest commendation from engineers, bridge-builders, and others interested in large wooden structures.

The object of this work is not only to obtain a better knowledge of the properties and technical adaptation of our woods, but to furnish an estimate of the interrelation between quality and physical appearance and structure, and also between quality and conditions of growth. At the same time opportunity is afforded by the examination of an unusually large amount of material of known origin to establish the laws and rate of growth of the different species, a knowledge upon the basis of which alone forestry can be carried on profitably.

One of the special investigations flowing from this work now in progress is as to the effect of turpentine orcharding upon the quality of the pine, the results of which it is expected will clear away the prejudices existing against such timber and place a proper value upon thousands of square miles of so-called turpentine timber.

DIVISION OF VEGETABLE PATHOLOGY.

During the past year, as heretofore, the Division of Vegetable Pathology has devoted special attention to field work, having in view the prevention of plant diseases. At the urgent request of a large number of western New York nurserymen and fruit-growers, an assistant of the division was sent to Geneva early in the season, with instructions to remain on the ground and conduct such investigations as would throw light on the cause of a number of destructive plant maladies and the best means of combating them. Through the courtesy of the experiment station authorities at Geneva the assistant was given a room in the station building, where every facility was afforded for doing good work. The investigations for the most part have been confined to nursery stock in the vicinity of Geneva, although considerable attention has been given to diseases of fruit in other parts of the State. As an indication of the interest and confidence in the work of the division it may be stated that nearly three million trees of cherry, apple, quince, pear, and other fruits in the nursery have been treated for leaf blight and other diseases the past season in the vicinity of Geneva. Taking the country at large, no less than ten million nursery trees were treated the past season in accordance with directions issued by the division. In addition to the work on nursery stock, extensive experiments have been made in treating diseases of orchard fruits, such as apple and pear scab, pear-leaf blight, peach rot, cherry-leaf blight, etc. Through the investigations of the division several of these diseases can now be successfully controlled at comparatively little expense.

In the treatment of grape diseases, several new lines of work have been undertaken; the principal one was an attempt to cheapen the treatments without affecting their efficacy. It was shown, among other things, that the copperas in the Bordeaux mixture could be reduced 90 per cent without apparently affecting its efficacy as a preventive of black rot and mildew of the grape. If the results of this experiment are substantiated by others made on a large scale and under varied conditions of climate, the cost of treating grapes for mildew and rot can be reduced from \$14 to a little over \$2 an acre. It is gratifying to announce that the efforts of the division to introduce cheaper machinery for the treatment of plant diseases is meeting with signal success. Suggestions have been made whereby suitable spraying machines have been manufactured in this country at far less cost than heretofore at home or abroad. Another drawback to a more general adoption of the treat-

ments suggested by the division has been the difficulty met with in getting the various preparations used put on the market in concentrated form. Suggestions have been made, which have been in a measure complied with, to firms to put upon the market the necessary ingredients for preparing, in small quantities, the various solutions, mixtures, etc., set forth in the publications of the Department.

The laboratory work during the year has been pushed forward with vigor. Investigations of this nature are always preliminary to practical work in the field. For the most part the work the past year has been confined to a further study of grape diseases, pear blight, peach yellows, the California vine disease, rot of sweet potato, and a bacterial disease of oats. The new lines taken up, and which as yet have not yielded sufficient results to warrant an attempt at practical experiments in the field, are investigations bearing on blight, foot rot, scab, and other diseases of the orange, rust of cereals, diseases of violets, carnations, and other greenhouse plants and several bacterial and fungous diseases of injurious insects.

Since my last report the work on the California vine disease has been continued. From the 1st of November, 1890, to the early part of May, 1891, the special agent in charge of this work was engaged in the preparation of a report on the subject. Since the completion of this report the agent has been engaged in laboratory and field investigations in various parts of California. The hope is strong that the virulence of the disease is abating, and the outlook in southern California is much more encouraging than at any time since the dread malady appeared.

At frequent intervals during the past three years urgent calls have come from Florida and elsewhere for information in regard to the diseases of citrus fruits. Practically nothing in the way of investigating the many serious maladies of this important group of plants has been undertaken in this country. In the early part of the year a special agent was sent to Florida with instructions to remain a month and collect such general information on the diseases of the orange and similar fruits as the limited time would permit. Later in the season a new disease, locally characterized as blight, wilt, or "go back," made its appearance to an alarming extent in several parts of Florida. Two special agents were detailed to visit the infested regions and gather as much information as possible on this and other diseases. Owing to the lack of funds the agents spent only a short time in the field, but it is believed that the information obtained will be of value when the time arrives for a thorough investigation of this subject, which will be when the means are forthcoming. The new disease has already caused thousands of dollars' damage in some of the finest groves in Florida, and there is no question that unless steps are taken to check it serious results will follow.

In the peach yellows investigation special attention has been given to a continuation of the work on fertilizer experiments and the com-

municability of the disease. As a result of three years' careful work, involving over 40 acres of orchard and the use of almost every conceivable kind of fertilizer, it may be said that in not a single instance has a case of yellows been prevented or cured by the use of fertilizers. This experiment was made to determine whether the cause of the disease was the lack of nutrition and immature growth. The question as to the communicability of the disease is no longer a matter of doubt, it having been proved conclusively that the malady may be communicated by budding. A disease called peach rosette, which closely resembles yellows, but which is even more virulent, has been studied in Georgia and elsewhere. Evidence seems to establish also the communicability of this disease.

In addition to the foregoing, exhaustive laboratory investigations on the disease in question have been under way. This, together with the other work, while not actually furnishing evidence as to the cause of yellows, is gradually narrowing the lines of research, making future investigations far more tangible.

OFFICE OF EXPERIMENT STATIONS.

The principal work of the Office of Experiment Stations under law is the preparation of publications relating to the work of the agricultural experiment stations. Nineteen documents, aggregating 1,335 pages, have been issued during the past year, chief among which is the second volume of the Experiment Station Record, consisting of 12 numbers, with a classified table of contents and a detailed index. This volume of the Record contains abstracts of 329 bulletins and 42 annual reports of the stations and 36 publications of this Department, aggregating 14,781 pages. It contains abstracts of sufficient length to show the object and plan of the investigations reported, the main facts necessary to an understanding of the way in which researches were carried on, and the results reached. It also contains suggestions of lines and methods of inquiry for our stations, and statistics and other information regarding experiment stations in this and other countries.

To meet the urgent demand, referred to in my last report, for information regarding the results of agricultural inquiry in Europe, the office has added to the Record reports of European investigations. It has been necessary, however, to confine the work to subjects of wide interest or immediate importance to our station workers.

The literature relating to investigations in agricultural science is so extensive that a general card index, prepared in the best manner and kept up to date, has become a necessity for investigators and students. The Department has been forced, therefore, to enter upon the preparation of such an index for itself and the experiment stations, and the first installment of cards has been issued to the stations and agricultural colleges. It is believed that such an instrument will be of very great

service, not only in giving information as to what has been done and thus preventing our stations from going over ground already covered, but also in suggesting new lines and methods of inquiry, and in raising the general level of our experiment station work.

Representatives of the office have visited twenty-three stations with a view to observing the progress and needs of their work and for personal conference regarding the interests of their common work.

The work of this division of the Department had so increased both in amount and scope that it became absolutely essential that the director should devote his entire time and energy to official duties. Prof. W. O. Atwater, realizing this necessity and not being able to comply with it, has resigned the directorship of the office. His services will, however, be retained, and the fruit of his wide experience and study with regard to European investigations in agricultural science will be made available by contributions to the Record in certain special lines.

Under the new organization of the office Mr. A. W. Harris, formerly assistant director, becomes director, and Mr. A. C. True, formerly first assistant editor, becomes assistant director. The editorial and clerical force of the office has been somewhat enlarged.

Agricultural experiment stations are now in operation in all the States and Territories except Montana and Idaho. During the year new stations have been established in Wyoming, Oklahoma, and Washington. Of the fifty-five stations in the United States, fifty in forty-three States and Territories receive their support wholly or in part from the United States Treasury. The stations employ 450 persons in the work of administration and inquiry. The mailing lists of the stations include about 350,000 names. The results and processes of their experiments are described not only in the station bulletins and reports, but also in thousands of newspapers and other periodicals. During the past year there have been many evidences of public approval of the stations and their work, as indicated by acts of State legislatures in their behalf and money grants by local communities, agricultural associations, and private individuals.

Among the investigations of wide interest which have engaged the attention of the stations during the past year may be mentioned those relating to the feeding of milch cows, pigs, and beef cattle; experiments in the culture and improvement and varieties of corn, wheat, oats, sugar cane, potatoes, and tomatoes; investigations of the nature of the various kinds of smut in cereals, and the testing of means proposed for their prevention; the devising of simple and practical methods for the testing of milk at creameries and at private dairies. In one State a thorough and systematic study of the soils by field surveys and laboratory tests is being vigorously prosecuted. In twenty-five States stations are performing, either wholly or in part, the chemical and other work connected with the inspection of fertilizers. In coöperation with this Department a number of stations are conducting experiments with ref-

erence to the introduction of the sugar-beet industry. The horticulturalists of the stations have extended the lines of their work, and in addition to the testing of varieties have carried on important investigations in the improvement of fruits and vegetables by cross fertilization and selection.

In general it may be said that the past year has brought many evidences that the individual stations are finding the lines in which they can best work, and are entering upon systematic courses of experimenting, which should ultimately bring results of great and lasting value to the agriculture of the country.

POMOLOGICAL DIVISION.

The fruit crop has been unusually large. All the orchard fruits have borne abundantly in almost every section; the plum crop is reported as being the largest ever known; and small fruits and grapes have been very prolific. The work of the division has been essentially along the lines indicated in my former report. The text and the plates of the wild grape monograph are completed and ready for the printer; but the expense of publishing the plates is so great that I am not yet justified in ordering their publication from the regular printing fund. The monograph is really of such value that it is hoped that the means may be provided for this publication.

A bulletin on the nuts of America, with illustrations, is now in press. Some new fruits have been imported and are being tested; among them, persimmons from Japan, reputed to be hardy enough for the Northern States; and some date palms from Arabia for the semitropical regions. Some new native fruits have been distributed, and more could be done in this line if the means were afforded.

One of the problems in pomological circles is how to secure a class of apples for the northwestern States that can endure their northern climate. It is claimed that, while much good has been accomplished by cultivating the Russian apples, it is found that they do not prove as successful as was hoped. Fruit-growers, therefore, have anticipated a possibility of securing a stock sufficiently hardy for the northern climate, and of good quality, from the propagation of wild fruit and native seedlings and by experimenting therewith, selecting and sifting continually the best, until really valuable ones may be obtained. It is claimed that the most valuable apples that they have to-day in the Northwest are not Russians, but have been developed on their own soil in the way above indicated. For this reason the Pomological Division is giving such consideration to this subject as its limited means will allow.

The work of the division continues in completing the record or the distribution of the various fruits and their varieties, so that ultimately an exhaustive monograph on that subject may be published. The bulletin on small fruits is well under way.

DIVISION OF MICROSCOPY.

During the current year this division has been engaged principally on microscopical investigations in relation to food adulteration, including the examination of various lard compounds, butterines, condiments, and commercial oils, and in microscopical examinations of samples of milk, cream, butter, and water received from various parts of the country.

The Division has, in addition, continued the collection, classification, description, and illustration of edible and poisonous mushrooms of the United States, and has made examinations of the structure, and experiments as to the tensile strength, of numerous textile fibers. It has also made investigation and comparison of the different classes, grades, and qualities of wool, and the microscopist has been frequently called upon to testify in the United States courts, in cases when these grades and qualities have a bearing upon the duty imposed.

The Department has just received from the State Department samples of wool from Chian, Palestine, and Asia Minor, an important addition to its collection, which will be used in future comparative examinations.

The Department has an increasing demand from all parts of the United States for additional information and for copies of the illustrations and recent reports made by this Division upon edible and poisonous mushrooms. The publication of these reports has stimulated a more lively appreciation of the value of an esculent which is used on so large a scale in European countries and which offers to the farmer an important and remunerative field of culture.

ARTESIAN WELLS, UNDERFLOW, AND IRRIGATION.

The Fifty-first Congress appropriated in all \$70,000 for investigations into artesian and underflow waters, the sources thereof, and their availability for irrigation within the region known as the Great Plains, and for an "inquiry into the best methods of cultivating the soil by irrigation." These appropriations were made under three different provisions, the first by act of April 4, 1890, appropriating \$20,000, the second by act of September 30, 1890, appropriating \$40,000, and the third by act of March 3, 1891, appropriating \$10,000. The first act required a report immediately after July 1, 1890, which report was duly made. The second required that the report be fully completed before July 1, 1891. The time for the completion of the final report under the first two appropriations was extended by act of March 3, 1891, to January 1, 1892.

The staff of the artesian and underflow investigation was again in the field very soon after the approval of the act of September 30, 1890. The engineers and geologists worked faithfully throughout the autumn and winter months in the southwestern and western portions of the territory under investigation. The chief engineer completed a progress report,

accompanied by maps and profiles of the territory embraced by and lying between the valleys of the Arkansas and North Platte rivers. These profiles illustrate the depth and location of the drainage or underground waters found within this section of the Great Plains. They show also the possibility of utilizing a large water supply now lost in the sand and gravel stratum of the two river valleys named. The reports already printed strongly confirm the claim now made that the loss by seepage within the porous strata of these river valleys is large enough, if it were restored to their channels, to make streams doubling in volume the present rivers. The geologist sent a brief progress report showing the existence of what are termed rivers of the mid-plains, *i. e.*, streams fed and maintained by the regional precipitation or rainfall, which streams if they could be diverted at their sources or recovered from the area in which they now sink, and be thereafter stored and diverted to the plains for the purposes of irrigation, would make certain the reclamation of a very large proportion of the region. The partial reports prepared by the chief engineer and the chief geologist were printed early in the present year with a progress report on irrigation which the special agent in charge had prepared under my direction in the Office of Irrigation Inquiry.

The field work was continued in the southwest during a large portion of the winter, and in portions of Colorado and Nebraska, till long after the first snows had fallen. As early as possible in the spring the staff of the artesian and underflow investigations was transferred to the northern portion of the region, embracing the two Dakotas, western and northern Nebraska, and a portion of eastern Wyoming and Montana. The southwestern assistant geologist continued at work during the winter and spring and until early summer, when he submitted his report embracing the several artesian basins in western and southwestern Texas. The whole inquiry throws a flood of light on the existence and extent of the two largest artesian basins known to the world, one being that of the Dakotas or James River Valley, and the other that of central Texas from Fort Worth to the south and west. Since the beginning of the field work in the investigation ordered by Congress, and as a result of the limited publication of the reports thereof, great encouragement has been given to the farming population west of the ninety-seventh meridian of longitude. The activity displayed in the search of artesian waters has resulted in the successful drilling of several hundred additional wells during the past year. No diminution of flow has yet been reported. It has added also to the hopefulness of the people, encouraging them in more or less successful efforts to utilize underground and other water supplies. At the earliest practicable moment the field staff was reduced in numbers, and the field work entirely suspended October 1, since which time the chief engineer and geologist have devoted themselves to the preparation of their reports.

The inquiry thus conducted necessarily embraced an examination of

several northern sections in which artesian waters were not expected to be found. These investigations include the Red River basin in the northern and eastern part of North Dakota, the Turtle Mountain and Devil Lake drainage basin, portions of the Upper Missouri and Milk River valleys, and engineer reconnoissance into the practicability of utilizing for the purpose of an irrigation supply certain lakes lying near the British-American frontier, and the report thereon will be sent to Congress with appropriate maps, plans, and illustrations.

The progress report prepared by the special agent in charge since the date of my last annual report makes a volume of over 300 pages. Besides the special agent's report proper, it contains a report on irrigation in the States of Montana and Idaho, with portions of Washington and Oregon, prepared by a special agent sent from this Department. It also contains papers on irrigation in Colorado and Nevada; others on the "Imbibition of rocks;" the "Culture of the raisin grape by irrigation;" "Irrigation in Australia," prepared by the special agent in charge; formulas for the measurement of water, and other matters useful to those interested in irrigation. A constant demand for the report of the Artesian wells investigation and for that of the Irrigation inquiry has been made on this Department. As Congress made no provision for their publication in any number, I have been unable to meet these requests. I have the assurance that the final report required by act of March 3, 1891, will be completed by January 1, 1892.

In completing the work of the artesian and underflow investigation, as assigned to this Department by Congress, the utmost effort has been made to make it as exhaustive as was consistent with the comprehensive duty imposed upon me. The work has been so well done, as I hope, that, from the standpoint of objective or surface inquiry, but very little of economic value can be added. Other work would necessarily be of an experimental character, embracing to some extent constructive processes not authorized by the present inquiry, and which I do not recommend to be undertaken by the National Government.

FIBER INVESTIGATIONS.

Fiber investigation during the past year has been confined chiefly to the flax interest in the Northwestern States, Minnesota being the center of cultivation, and to sisal-hemp culture in Florida.

Early in the year the Department imported from Europe three varieties of flaxseed for experimental culture, as follows: Pure Riga, White Blossom Dutch, and Belgian (Riga seed grown one year in Belgian soil). These were distributed to a very carefully selected list of names made up of flax farmers, directors of agriculture experiment stations in possible flax-growing States, and flax manufacturers. It is too early to give the results, but the samples of straw already submitted indicate that a good quality of Russian and Belgian flax may be grown and may come to perfect maturity over a large extent of our country.

Capital has been attracted to the industry, and several new manufacturing enterprises have been established. Altogether the outlook for the industry is most encouraging. Its greatest need, however, is the establishment of scutching mills by factors or buyers who will purchase the crop from the farmer when matured, harvesting it, and retting and scutching it under one supervision, in each community, and selling the fiber directly to the linen mills. Such a division of labor is essential to the success of the industry.

The flax products (raw fiber and manufactured) imported into the United States in a single year amount to at least \$15,000,000, the larger proportion of which can be produced at home with the reestablishment of the flax industry.

Sisal hemp is now growing in many portions of southern Florida, where its cultivation long ago passed the experimental stage. A fiber survey of the Florida Peninsula made last spring by the agent of this Department found the sisal-hemp plant growing most luxuriantly in a state of nature from Jupiter Inlet on the east coast down to Cape Florida, on many of the keys, and along the west coast as far north as Charlotte Harbor. On the keys plants were found with leaves from 5 to 6 feet in length and weighing $1\frac{1}{2}$ to 2 pounds, and the fiber is of superb quality. The imports of sisal hemp from Yucatan into the United States in a single year amount to \$5,000,000.

The interest in ramie still continues, but little can be accomplished, however, until the decorticator question is settled. The Department hopes to conduct at New Orleans during the coming year a trial of American machines for extracting the fiber, for which purpose a large quantity of ramie will be especially grown. There are already eight machines which would come into such a competition, besides several processes for extracting the fiber.

DIVISION OF GARDENS AND GROUNDS.

The distribution of plants from the division of gardens and grounds during the past year aggregated over 117,000 specimens, consisting of various hardy and semitropical species, special regard having been paid to their adaptation to various localities. On this special point there are many erroneous opinions entertained by applicants, both in regard to the climatic conditions indispensable for the healthy growth of plants, and to the value of the products from a commercial standpoint. It is almost a daily occurrence to receive requests from the warmest portions of the Southern States for strictly tropical vegetation, although the area where these plants can have even a semblance of success is very limited and of doubtful permanency at the best.

Correspondents in making requests for plants of such tropical species as coffee, nutmeg, cinnamon, cloves, tamarind, etc., will indicate their faith as to climate by stating that they have no frosts, although the

thermometer will at times drop down to 32° F., thus intimating the conviction that a tropical climate is shown merely by absence of freezing, whereas a tropical climate is one where the thermometer rarely shows lower than 70° F. Again, even with a suitable and favorable climate many of the staple products could not be raised as a profitable enterprise. Cinchona for instance is now grown to such an extent in the East Indies that the price of the article is so low that West India plantations are being abandoned on that account. The coffee plant and the tea plant, the latter especially, can be grown over a large territory in the United States, but only as a domestic product. Coffee has but a limited area in southern Florida, but the cost of picking and preparation for market would, as in the case of tea, leave no margin of profit when placed in the market to compete with the products of other countries.

While, therefore, the Department makes limited distributions of many semitropical plants, care is taken to advise against extended planting, or extended investments, until tests have proved the practicability of success.

The catalogue of economic plants in the collection of the Department, which I directed to be prepared for publication, was duly issued. There has also been issued from this division a bulletin entitled *Papers on Horticultural and Kindred Subjects*, which, although issued only a few months since, has been so widely called for as to make the propriety of publishing a second edition a subject for present consideration.

DIVISION OF RECORDS AND EDITING.

The wisdom of establishing the Division of Records and Editing becomes more and more apparent as the number of publications which are issued from the Department increases, and these are extended so as to cover a wider variety of subjects. The division is not only able to accomplish such editorial work as is necessary with reference to the bulletins prepared in the various divisions, and to exercise a general supervision over the publishing interests of the Department, but also to promote in a marked degree the advantageous and economical use of the printing fund.

For the first time I am able to express satisfaction with the extent of the appropriation made for the printing of this Department, which will render unnecessary the frequent delay in the publication of important bulletins entailed in previous years by the exhaustion of the fund, and the necessity of procuring a deficiency appropriation in order to enable them to be published at all. The Department is obliged to depend eminently upon its printed matter in order to reach the farmers in the country, and the character of our work, closely relating as it does to the several seasons of the year and their varying conditions, has always made delay in the publication of important documents a matter of grave

inconvenience, and it is not infrequently of serious loss to the farmers of the country. This year, I am happy to say, such need not occur.

The preparation of advanced notices of forthcoming bulletins for the use of the press, which was inaugurated soon after the organization of the division, has been continued in response to a very general expression of appreciation of this feature of the work, and because it is found to insure the advantageous results of prompt distribution of our publications.

DOCUMENT AND FOLDING ROOM.

The work of the Document and Folding Division, though not materially changing from year to year except as it increases with the enlargement of the number of publications of the Department, has been greatly facilitated by the transfer of the division to rooms much better adapted to its work than those it formerly occupied. Applicants whose names are upon our mailing lists to receive particular publications are now able to be supplied with these immediately after their receipt from the Public Printer. Prompt and suitable distribution of printed information, furthermore, has been promoted in a marked degree by the notices issued to the agricultural press by the Editorial Division in advance of the actual appearance of publications.

SEED DIVISION.

The amount appropriated by Congress for this division has been expended to the best advantage in accordance with the intentions of Congress in relation thereto.

RAINFALL EXPERIMENTS.

At the first session of the Fifty-first Congress the sum of \$2,000 was added to the appropriation for the Division of Forestry of this Department for the purpose of conducting experiments to ascertain the feasibility of producing rain by means of explosions. At the second session of the same Congress a further appropriation of \$7,000 was made in the same form and for the same object. The Division of Forestry having no special facilities for the conduct upon a sufficiently extensive scale of such experiments, I concluded to place them in charge of a special agent selected from outside the Department service. Due preparation having been made, the experiments were conducted on an extensive scale during the past season in Texas. I have every reason to believe that, so far as the production of explosions is concerned, these experiments were eminently successful. As regards the object thereof, namely, the production of rain, I have no data yet at hand which would justify me in expressing any conclusions on the subject.

WEATHER BUREAU.

Immediately upon your appointment, July 1, of Prof. Mark W. Harrington, of Michigan, as Chief of the Weather Bureau under the Department of Agriculture, a consultation was held with that gentleman with a view to the efficient reorganization of the Bureau, to carry out the expressed intention of Congress to especially develop its work in the interest of agriculture. The working force of the Bureau, including the civilians and three commissioned officers of the Army, was transferred to the Department of Agriculture on that day, and all the regular employees of the Bureau under the Signal Service were retained. The office force at headquarters was reorganized into three principal divisions, namely, the Executive Division, Records Division, and Weather Crop Bulletin and State Weather Service Division, other branches of the work being conducted substantially under the same organization as existed prior to the transfer. The observing force outside of Washington was reorganized by the appointment of local forecast officials provided for in the appropriation bill, the appointee in every case being selected from the most experienced and competent observers of the service.

The extent of territory assigned to them has been in many cases extended to cover a whole State, or the part of a State nearest the station, and the restriction of forecasts to twenty-four hours was removed to the extent of allowing them, especially in harvest season, to predict the weather for more than one day in advance, whenever the meteorological conditions were so pronounced as to make forecasts for a longer period reasonably certain of verification. They were also instructed to study and endeavor to meet the various wants with reference to meteorological information of the several classes of the communities in which they are located, and to seek and employ every means of speedily reaching farmers with their forecasts. Means were adopted to secure much needed improvement in the weather maps issued at the principal stations, an improvement which is already quite marked. The issue of maps has been authorized at Albany and Oswego, N. Y.; at Charlotte, N. C.; at Charleston, S. C.; at Marquette, Mich.; and at Parkersburg, W. Va.; stations not heretofore issuing them, and the edition of maps at all stations has been very largely increased.

Since July 1 a number of stations at military posts have been discontinued, and many new ones established at the nearest city or town. There are still a few stations at military posts, the transfer of which to more central locations is being considered and arranged. The station at Fort Grant, Ariz., has been transferred to the agricultural college at Tucson, and still another transfer to an agricultural station is under consideration. Arrangements have been made by which the reports from special cotton region stations, heretofore sent only to Weather Bureau centers, are transmitted also to the several State weather serv-

ice headquarters for incorporation in the monthly publications, weather crop bulletins, etc., issued by them. At the urgent request of those interested in cotton, arrangements have been made to include in these reports telegraphic information of the first killing frost at every cotton region station. It is also designed to establish ten stations of observation in the sugar region, from which reports of temperature, rainfall, and frost will be telegraphed to a designated center daily, for publication and dissemination throughout the sugar belt.

An exhibit was made at the New York and New England Fair held at Albany in August, showing the working of a Weather Bureau station, including the instruments used, the issue of the weather maps, etc. The results of this exhibit were most gratifying, and will justify other exhibits of the same character on similar occasions, so as to give the people attending these fairs more intimate acquaintance with the working and objects of the Bureau. New weather services have been organized in Arizona, California, Florida, New Mexico, North Dakota, Oklahoma, Utah, Virginia, Washington, West Virginia, and Wyoming, making the number of State services in operation September 30 thirty-nine, and a complete local service will be organized at an early date in Georgia to meet the demands of the cotton-growers in that State. More than one hundred new voluntary meteorological stations have been established and equipped with instruments at the expense of the Bureau since July 1, and nearly as many more where the instruments were furnished at private expense.

The most practical work of the State services is the issue of the weekly weather crop bulletins, sources of reliable information for all interested in agriculture, following up the season weekly, so that an excellent estimate can be made at any time relative to the crops of any county, State, or the country at large. This branch of the service has been highly complimented. On June 30, 1891, there were 630 weather-signal display stations in operation to which the forecasts were telegraphed; 90 stations to which cold-wave warnings were telegraphed; 61 frost warning, and 6 rain warning, the latter in California. September 30 the number of weather-signal display stations in operation was 1,200, an increase of nearly 100 per cent in three months. As an instance of the value of frost warnings, I will quote a single instance by which, as the result of a warning of a killing frost in Wisconsin on August 24, over one-third of the cranberry crop, representing \$125,000, was saved through flooding. Frost warnings in Minnesota and the Dakotas in August enabled farmers to prevent much damage to their crops by the use of smudges, causing a dense smoke. In Kentucky nearly 150 frost-warning stations have been established and are now in operation for the protection of the tobacco interest.

The number of voluntary observers throughout the country has been greatly increased since the transfer of the Bureau to this Department, the percentage of increase in July and August being greater than at any

time during the year ending June 30, 1891. There are now about 2,200 voluntary observers in the United States, being an increase of about 400 for the past three months, and steps are now being taken to cover every section of each State or Territory with voluntary stations of observation, so as to leave no section without stations from 20 to 30 miles apart. To accomplish this it will be necessary that public-spirited towns or individuals purchase the instruments and shelter at a cost of about \$20 for each set. There are but 150 sets of self-registering thermometers on hand for issue, and already nearly double that number of places have been located from which observations will be desirable.

Thus far the present year 258 thermometers and 93 rain gauges have been issued to voluntary observers, as against 157 thermometers and 52 rain gauges during the corresponding period of last year. The completion of an index of meteorological observations in the United States last year will be followed by the completion, at the earliest practicable date, of a similar working index for each of the grand political divisions of the world outside of the United States. The other divisions of the work, such as the service on the seaboard and Great Lakes, the river and flood service, etc., which were already in force, have been continued and enlarged, but I confine myself in this report to special mention of those features which relate especially to the development of lines of work designed especially for the benefit of agriculture.

At the recent conference of representatives of the weather bureaus of different countries in Munich, at which, as already stated, we were represented by the Chief of the Bureau and Prof. Abbe, a permanent international meteorological committee was appointed to superintend the execution of resolutions adopted by the congress and to provide for the convening of a similar congress at a future date. The fact that the Chief of the Weather Bureau was made not only vice-president of the conference, but also a member of this permanent committee, will indicate the appreciation in which our service is held by foreign meteorologists.

I have already referred to the initiation of measures for the future extension and development of the Weather Bureau in coöperation with the agricultural colleges and stations.

In concluding the review of the work done under the several divisions of this Department since the date of my last annual report, it gives me pleasure to state, and I say this advisedly, that each one of more than a dozen divisions whose work I have reviewed has returned in actual value to the country during the past year far more than the entire annual appropriation accorded to this Department.

When I assumed control of this Department I found most of these divisions already in existence and engaged largely on their present lines of work. Having satisfied myself as to the character and value of this work, I was content to let them continue as originally organized, encouraging them in every way in my power toward the achievement of

practical results, and on the line of cordial coöperation in all useful work. My personal attention was especially devoted to a general enlargement of the scope of work of the Department in the interest of practical agriculture, and especially to three principal objects: first, the extension of the market for the disposal of the surplus of our great staple crops, including the cereals, and especially our vast animal products; second, the enlargement of our productive capacity, so as to achieve the gradual substitution of home-grown for imported products; and third, the bringing of the Department into such close relations with the farmers of the country as would make them acquainted with our work and inspire them with confidence in our ability to serve them, as well as to impress more forcibly upon the responsible officers of the Department themselves the wants and conditions of the tiller of the soil. This report will not have accomplished its purpose fully unless it serves to satisfy you that these objects have already been measurably attained, and that, by steadily keeping them in view and extending and developing the means already adopted toward their accomplishment, we may reasonably entertain the hope of placing this Department upon a plane of usefulness commensurate with the fondest anticipations of all those who labored so long and so earnestly to raise the Department to its present official dignity, and to extend its opportunities for valuable work.

The time seems opportune for me to make some suggestions as to the best means of maintaining to the fullest extent the usefulness of the Department, and of still further developing its opportunities for the future. It is rarely given to any single man to superintend the completion of a great work which it has required a wide and mature experience to successfully plan, but the wise builder knows well that without a well-determined plan the building, when completed, will surely be found deficient in some respects. What this Department must eventually be in order to fully answer the expectations in which the farmers of the country have a right to indulge, and for which the National Government must make itself responsible, is the consideration which now deeply concerns me. The first thing to be done in considering this subject is to define the obvious functions of the Department so as, on the one hand, to fully meet all just expectations, and, on the other, to avoid any infringement on the sphere of work properly belonging to and undertaken by other legitimate agencies.

Primarily the work of the United States Department of Agriculture may be, I think, briefly summarized under two heads: first, scientifically, the collection and distribution of all information of practical value to the farmer in the culture of the soil; second, administratively, the control of all matters relating to agriculture coming under the head of interstate or foreign trade. The first involves the acquisition of information by special and intelligent observation and study of all known facts having a bearing upon the culture of the soil and the disposal of

the crops, and to this end we must be prepared to employ the highest order of expert talent, both practical and scientific. This first proposition also involves a careful scrutiny of all natural phenomena affecting agriculture, and continued research into the principles which underlie them, necessitating the very highest order of scientific investigation, both by experiments in the laboratory and experiments in the field. My second proposition involves the conferring upon the Secretary of Agriculture of the fullest powers necessary for the supervision and control of all interstate or foreign commerce in agricultural products and of fraudulent and other substitutes therefor, for the investigation of all animal diseases, and for the control of the movement of all animals which may be affected by communicable diseases, and even within certain limits for an adequate supervision of the trade in agricultural products in all foreign markets.

As the immediate result of an acceptance of this definition of the scope of the work devolving upon the Department, it is evident that our present facilities will need to be greatly enlarged. It may be objected, therefore, by those whose idea of good government never goes beyond the one idea of economy, or by those—of whom there are not a few—who, though willing to afford to the Government all the means necessary for the efficient transaction of its business, utterly fail to appreciate or to estimate the full importance of the work of a department exclusively devoted to the field of agriculture, that a complete equipment of this Department on the lines which I have indicated would involve too great an expenditure. To such I would reply by calling their attention to the fact that in another twenty years the population of this country will exceed 100,000,000 persons, of which number more than 30,000,000 will be actually engaged in gainful occupations, and that probably 40 per cent of these will be directly engaged in agricultural pursuits, and that upon their efforts not less than 40,000,000 of people will be directly dependent for a living, while the whole population indirectly will depend for its well-being and prosperity upon the success which will attend the efforts of those devoted to agriculture.

When that day comes, and the increase of land values and enlarged demands of increased population and of a greatly increased foreign trade shall have necessitated the development by artificial means of vast areas now uncultivated, the efforts of this Department on such lines as I have laid down will have increased the value of our annual agricultural products from between \$3,000,000,000 and \$4,000,000,000 to at least twice that enormous sum. In the face of such stupendous figures, which it needs no prophetic vision to clearly see, I submit that the largest sum necessary for the efficient carrying on of the work I have indicated will be comparatively insignificant.

Very respectfully, your obedient servant,

J. M. RUSK,
Secretary.

REPORT

OF THE

SECRETARY OF AGRICULTURE

1892

WASHINGTON
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1892



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REPORT
OF THE
SECRETARY OF AGRICULTURE.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., November 15, 1892.

To the PRESIDENT:

I have the honor to submit my fourth annual report as Secretary of Agriculture. If I was able to express gratification a year ago at the improved condition of our agricultural industry since my first report as Secretary of Agriculture was submitted to you, I am assuredly still more justified in feeling gratified by the general condition of the agricultural interest in this country to-day.

In every report which I have had the honor to present to you I have sought to emphasize as forcibly as possible, and in such a manner as would impress my fellow-citizens, the vast importance of agriculture as a factor in this country's prosperity. The fact that agriculture is the only industry in this country having an individual representation in the National Government, possessing, as it does, an executive department devoted exclusively to its service, and represented in the Cabinet by one of the eight persons who are known as the advisers of the Chief Executive, needs no further justification, in my opinion, than the facts in reference to it which I have had the honor to submit in former reports, and those which I have the honor to present herewith. Most truthfully can it be asserted that the agricultural industry in this country underlies the entire system of the body politic: not a single individual in the country but what is dependent directly or indirectly upon this industry.

I shall dwell for the present upon one feature only as sufficiently illustrative of the relation borne by agriculture to all other industries and to the national prosperity. I refer to the place of agriculture in our foreign trade. For many years, and during the few years of the present administration especially, the question of our foreign trade, both as to exports and imports, has been most prominent in the mind

of the entire country. To it has been assigned the largest place in national legislation, while at all recent elections involving a possible change of administration from the domination of one great party to that of the other, it has been one of the leading questions, if not the leading question. I can make no mistake, then, in appealing for an earnest consideration of the following figures representing the relative proportions of agricultural products in both our export and import trade.

OUR FOREIGN TRADE—EXPORTS.

Reviewing the fiscal year which closed June 30, 1892, we find that our foreign trade in that year far surpassed that of any previous year in the history of the country, aggregating a grand total of \$1,857,679,603, or more by one hundred and twenty-eight millions than ever before. Of this great sum \$1,030,278,030 represented our exports, and of these all but fourteen and one-half millions represented domestic produce, which amounted, for the first time in our history, to more than a billion dollars. By a brief comparison with former years we find that during the past fiscal year the balance of trade in our favor was over two hundred and two millions against less than forty millions last year, and an adverse balance of nearly three millions in 1889, and of over twenty-eight millions in 1888. Moreover, the increase in trade over the figures of the previous year was entirely in our exports, the imports showing a slight falling off from the record of 1891.

Having thus briefly presented a few figures showing the magnitude of this foreign trade, and especially of our exports, I will now show what share our agriculture had in this most important phase of our national prosperity. Of the vast sum representing exports of our domestic products, nearly 80 per cent, or, to be very exact, 78.1 per cent, consisted of agricultural products, the same being \$793,717,676, a sum which exceeds by more than one hundred and fifty millions the shipments of agricultural products in any previous year, while it surpasses the record of 1889, when this administration undertook the direction of affairs, by more than two hundred and sixty millions. Indeed, it is actually greater by sixty-three millions than our total exports of all products in that year, while it exceeds the value of our total foreign trade, imports and exports included, prior to 1870. Surely, nothing more is needed to emphasize the relations which agriculture bears to our foreign trade; but it may be necessary, in order that the importance of our foreign trade may be properly understood, and that the part which this Department has been able to take in this extraordinary development may be appreciated, that I should present a few considerations suggested by these wonderful figures. Ordinarily, the first thought that will suggest itself in studying them will be that by this foreign trade and the abundance of our own domestic production the United States has been made the creditor of the world for a sum exceeding \$200,000,000. But great as this may

seem, the importance of this fact is but slight compared with the extent of the benefits conferred upon the entire country by the removal of these domestic products from our home markets, thus relieving these of a surplus which must have resulted in such a reduction in prices as would have brought them below the cost of production. In all consideration of our foreign trade this feature of relieving the home market from a glut of production must always be the most important.

Later on in this report I shall have occasion to show, by reference to some of the work undertaken and accomplished by this Department, what part it has been able to take in the development of this important trade with foreign countries, and shall also say a few words in regard to what part it might have taken and ought to take were its facilities sufficiently enlarged. In the mean time, as having a most important bearing upon the work of this Department and its duty in the future, I will call your attention to some features of our import trade, in which the agricultural industry is also deeply interested.

IMPORTS.

The total import trade for the fiscal year under consideration exceeded eight hundred and twenty-seven millions, of which it appears that 51.6 per cent was made up of agricultural products, an increase of eighteen millions over similar imports in 1891 and of fifty-three millions over imports of 1890. I am glad to be able to state that an examination of the items making up these agricultural imports shows this increase to be mainly confined to products that do not compete with our own producers. In fact, a comparison of the year under consideration with the fiscal year ending in 1889 shows that, while in the last-named year our imports embraced 54 per cent of agricultural products coming into competition with our own, a similar division for 1892 shows but 44 per cent of such products. This is highly encouraging as an evidence of the value to our agricultural interests of the policy of this administration. At the same time, this gratifying result must not cause us to ignore the fact that of our total agricultural imports so large a proportion still consists of products competing with the American farmer in our own markets. It must be borne in mind, further, that in a certain sense the competition is greater than appears on the surface; that is, the estimated value being the value at port of shipment, both as regards exports and imports, the cost of transportation and distribution must be added to the valuation of imports at port of shipment in order to represent accurately what our consumers pay for agricultural products. We still import over \$40,000,000 worth of animal products, exclusive of wools, which are included in the fibers, and of these last, the fibers, we imported in the past fiscal year over \$67,000,000 worth, the far greater part of which, or substitutes for the greater part of which, could certainly, with proper encouragement, be grown in our own country.

In this connection I would call attention to the fact emphasized in my last annual report, namely, the large import of hides which are admitted into this country duty free. Our annual imports of this class of goods for the past two years have averaged over \$27,000,000, thus necessarily causing a great depreciation in the prices realized for hides of domestic production. I must, therefore, renew most earnestly the recommendation made in my last report, namely, "That the duty provided for in section 3 of 'An act to reduce the revenue and equalize duties on imports, and for other purposes,' approved October 1, 1890, be imposed in all cases where the countries from which such hides are shipped have not granted equal concessions in regard to the admission of the agricultural products of the United States." Our imports of raw silk, also admitted free, have greatly exceeded those of the previous year, while they have been greater than even the very large imports of 1890. The difficulties attending the domestication of silk production in this country have been fully set forth in previous reports. At the same time, so long as we continue to be the largest consumers of raw silk in the world and to pay over \$25,000,000 a year to foreign producers therefor, we ought, in my opinion, not to relax our efforts to introduce this industry among our own people.

Of fruits and wines we import yearly \$30,000,000 worth or over, and of this class of products there can be no question that, with our great variety of soil and climate, all could be produced in the United States.

The brief review which I have thus given of the relations of our agriculture to our foreign trade, both export and import, very clearly emphasizes the main, ultimate object of all the work of this Department, namely, the closest study of all markets abroad which may be reached by our own agricultural products, accompanied by persistent and intelligent efforts to extend them, and the substitution in our own markets of home-grown for foreign-grown products. It has been my duty to express this view in former reports, but every year brings before me so much additional evidence to justify and confirm it that it is impossible for me to make an intelligent report upon this Department and our agricultural interests without reiterating and emphasizing it.

LIVE-STOCK EXPORTS—PRICES.

It affords me great gratification to be able to confirm, by the experience of the past year, the anticipations formed as to the good results which would be brought about by the efforts of this Department under the extension of its powers afforded by then recent legislation. When I submitted my report last year, indeed, that legislation was for the most part so recent that it was impossible to speak very fully as to the results, encouraging as were the indications then observable. The inspection laws by which this Department has been afforded so wide and thorough a control of the animal industry of the country, especially as regards its export trade, have now been in operation, I think, a suffi-

ciently long time to give to the facts which I am able to lay before you in this report very great weight in estimating their benefits.

“THE AMERICAN HOG.”

When I submitted my last report the prohibitions existing against American pork had been withdrawn by the Governments of Germany, Denmark, and Italy. Since that time similar action has been taken by the Governments of France, Austria, Spain, and Belgium, so that in fact there exists to-day no prohibition whatever in any country against the admission of American pork products bearing the certificate of inspection of this Department. Since these prohibitions have been removed more than 40,000,000 pounds of inspected pork have been shipped to Europe, none of which, presumably, without inspection would have found a market abroad; while, comparing the total trade in hog products with Europe for corresponding periods in 1891 and 1892, we find that in May of this year there were shipped 82,000,000 pounds, against 46,900,000 pounds in the same month of 1891. In June the exports for 1892 aggregated 85,700,000 pounds, against 46,500,000 pounds the previous year. July showed an increase of 41 per cent and August of 55 per cent over the corresponding months of 1891.

Taking, as a period in which the effects of inspection can be clearly noted, the four months of May, June, July, and August together, we find an increase in that period this year of 62 per cent in quantity of hog products shipped to Europe, as compared with the same period last year, and we find, moreover, and this is particularly noteworthy, that this enormous increase has been accompanied by an increase in the price of the exported articles, making the increase in values in the same period 66½ per cent. A comparison of prices for September, 1892, with prices for September, 1890, the year before inspection was put in force, shows an increase of 80 cents per 100 pounds in the prices received by farmers for their hogs, an increase in value of 18¼ per cent. To make the benefit secured to the farmer definitely clear, I may state that such an increase adds an average of \$2 per head to the selling price of every hog sold in the United States.

I have noted above the great increase in shipments and the increase in value per head of every animal sold. There remains still one more important fact to be noted in regard to this trade, and that is, that accompanying this great increase in price there has occurred the heaviest marketing of hogs known in the history of the country, the effect of which, under ordinary circumstances, would be to greatly depreciate prices. Taking the two years ending March 1, 1892, we find that there were marketed in the United States nearly 45,000,000 hogs, as against less than 36,000,000 in the two years preceding. These figures are especially commended to the consideration of those persons who have been disposed to smile at the great prominence given to the “American hog” in recent years.

CATTLE.

The effects of our meat-inspection laws, together with the control of animal diseases and the better condition of ocean transportation, have brought about results no less gratifying in regard to the cattle industry.

THE COUNTRY FREE FROM PLEURO-PNEUMONIA.

The 26th day of September last marked an epoch in the cattle industry of this country, for on that day I was able to proclaim the country absolutely free from contagious pleuro-pneumonia, the dreaded disease which, introduced into this country from Great Britain, has been for so many years made the ground by the British Government for enforcing most grievous restrictions upon the cattle trade of the United States so far as exports to that country are concerned. This proclamation will appear in its proper place further on in this report in reviewing in greater detail the work of the Bureau of Animal Industry; but I will state here, with the utmost emphasis, that that proclamation was issued only after the most thorough investigation and inspection of all sections in which the disease has existed during the past few years, an inspection in no way relaxed for months, and in some cases for years, after the occurrence of the last case of disease, and under conditions which make it absolutely impossible that this proclamation should have been premature.

It must be borne in mind that, accompanying a gradual and justifiable relaxation in the inspection for contagious pleuro-pneumonia in certain districts, there has been a wide extension, under the cattle and meat inspection laws, of the inspection force of the Bureau of Animal Industry of this Department, so that to-day it would be absolutely impossible for a case of this disease to occur without its prompt discovery by the officers of this Department. The number of animals inspected both before and after slaughter, at the great slaughtering centers of the country, by officers of this Department, aggregates over 3,000,000 head a year. Add to this the fact that every live animal crossing our borders is now, under the law of August 30, 1890, made the subject of veterinary inspection; that animals imported from Europe are made the subject of a ninety-days' quarantine, during which they are constantly inspected; and finally that, as has been before remarked, in the few isolated and restricted sections in which pleuro-pneumonia has existed in this country during the past few years, the most drastic measures of eradication have been followed by a thorough and watchful inspection, lasting from six months to a year and more after the occurrence of the last case, and there is certainly an accumulation of evidence sufficient to satisfy every reasonable person, not only as to the complete justification for the proclamation of immunity of the 26th day of September, but as to our ability to absolutely exclude from our soil forever this dreaded disease, which can only be propagated by actual contact with infected animals or premises.

REGULATIONS ON TEXAS FEVER.

By the regulations imposed by the Department for the prevention of Texas fever—regulations which it becomes more easy every year to enforce—this disease has been almost entirely prevented. Not only have our regulations guarded against the direct losses from the disease, but they have greatly facilitated the transportation of cattle, and have been the principal factor in securing a reduction in insurance rates, by which \$5 has been saved in that item alone upon every steer exported. In a word, I may say advisedly that the regulations for the prevention of Texas fever have saved three times as much money to the cattle-growers of this country yearly as is required to run the whole Department of Agriculture.

RESULTS OF INSPECTION LAWS.

One of the results of the more rigid inspection enforced by this Department under the laws of 1890 and 1891 has been the withdrawal by Great Britain of the prohibition formerly existing in that country against sheep from the United States. I deeply regret to say, however, that there are no indications on the part of the British Government of an intention to modify the restrictions now imposed on our cattle export trade to that country as the result of the freedom of this country from contagious pleuro-pneumonia, and of the control exercised by this Department by which danger to export cattle from Texas fever is absolutely avoided. Notwithstanding, however, the continuance of this restrictive legislation, the success attained by this Department in its efforts for the prevention and control of cattle disease has been recognized in the foreign trade.

In 1889, the year in which I assumed the direction of the Department, we exported 205,786 head of cattle, while in 1892 we exported 394,607 head. Moreover, this increase in the quantity of cattle exported was accompanied by an increase in value per head. Thus, while the total value of export cattle in 1889 was \$16,600,000, it was in 1892 over \$35,000,000, the increase in value showing the animals to be worth \$8 per head more than in 1889. The exports of dressed beef continue to increase, exceeding considerably in quantity, and still more in value, the exports of last year, while they exceed the exports of 1889 by about 60 per cent.

BENEFITS TO THE CATTLE-GROWERS.

As regards the benefits to our cattle-growers, I will, as in the case of hogs, make a comparison between the prices for cattle in Chicago for the month of September, 1892 and 1889. In September, 1892, there was 37 per cent more cattle marketed than in the corresponding month of 1889, and, in spite of this great increase, there was also an increase in prices, ranging from 24½ cents per hundred on common steers to 78 cents per hundred on second-quality steers. Even on the com-

mon butcher steers, marketed in such enormous numbers that it is wonderful they have held their own in price, we find that the selling price increased $8\frac{1}{2}$ per cent, the increase in second quality and good to choice being 18 per cent. The average increase all around can not be less than 15 per cent, and amounts to from \$4 to \$15 per head, according to the weight of each steer sold. Putting the average increase on the selling price of cattle at \$8 per head—a moderate estimate from the figures just given—the aggregate benefit to cattle-growers of this country would be about \$40,000,000.

INDIAN CORN IN EUROPE.

At the same time that these most desirable results have been obtained in reference to our live-stock products, the attempt, undertaken two years ago, to extend the use of our Indian corn in Europe has been continued. During the past twelve months the special agent of the Department charged with this work has been prosecuting his mission in Germany, that country seeming to offer for several reasons the most desirable, if not the most promising, field of labor. In the first place, the bulk of the German people are not accustomed to the use of wheaten bread, their principal bread supply being rye. Secondly, the experience in that country—which is obliged to import yearly a large proportion of its cereal food supply—as the result of the deficiency in Russia, which led to the entire prohibition of cereal exports from that country, whence Germany had ordinarily drawn its chief supply, seemed to offer a favorable opportunity to acquaint the German people with the merits of Indian corn, it being more likely that they would test the merits of a new cereal food at a time when that to which they were accustomed was scarce and dear. In this I have not been disappointed, and I feel that we have reason to be well satisfied with the results of our agent's efforts in that country. He had necessarily to encounter many difficulties. It is not an easy thing to induce people at any time to try new kinds of food, especially where the kind of food in question is one which has been quite generally regarded, as has been the case with corn in Europe, as not suitable for human consumption.

Again, the channels through which our agent had sought principally to accomplish his work in Great Britain are not as available in Germany, and, lastly, the domestic customs of the people do not lend themselves as readily as with us to a corn diet. Home-made bread is rare, and hot bread is almost unknown, all bread being made by the bakers and sold by them to all classes, including the poorest. This necessitates that the bread in common use should have keeping qualities. The best solution to these difficulties was found in the manufacture of a mixed bread, composed of rye and corn, which was found to considerably cheapen the cost by comparison with bread made entirely of rye, to be palatable, and to possess the keeping qualities necessary among people who oftentimes purchase their bread supply

once a week. Samples of this mixed bread were baked under the instructions of our agent and distributed widely. The conditions to which I have already referred induced many people to try these samples who would otherwise not have been induced to do so, and quite a number of the bakeries in Berlin and in some of the other leading cities undertook the making of this mixed bread, submitting it to their customers, as the price lists forwarded by our special agent show, at a considerable reduction from the price of rye bread alone. The attention of health officers was directed to the subject and, as is usual in European countries, the new bread was subjected to rigid tests, with a view to establishing its comparative healthfulness. So far as we can ascertain, the results of these investigations have been generally in its favor; in some cases, markedly so. Investigations have also been undertaken by direction of the military authorities with a view to testing the value and availability of Indian corn, in the form of such a mixed bread as I have described, as an army ration. I need hardly say that every facility has been afforded the authorities by our agent to make the fullest tests as to the value and keeping qualities of the bread, and it is hoped that ere long some report as to the result of these investigations will be made public. It can not, I think—and all Americans will agree with me—be otherwise than favorable.

Some allegations were made in opposition to the use of Indian corn, to the effect that in some sections of southern Europe a disease known as "pellagra" was occasioned among the peasantry by its use, and it was even said that this disease had been found to exist in the armies of France, of Italy, and of Mexico, as the result of a bread ration of Indian corn. Through the courtesy of our consular officers, through whom Col. Murphy instituted immediate inquiries, he was enabled to refute this charge promptly and effectually. It was found that such a disease did, indeed, occur occasionally among the peasantry in some sections of southern Europe, which was attributed to eating preparations of Indian corn insufficiently cooked. As regards the disease among soldiers, it was learned that corn meal or corn bread forms no part of the ration of a French soldier. Consequently, whatever diseases might be common in the French army, they could not possibly be attributed to this cause, while from Mexico it was learned that although Indian corn formed a part of the regular ration of every soldier no such disease was known among them.

Some of the good results accomplished by the agitation of this corn question in Germany are to be found in the introduction, in a considerable number of mills throughout the country, including Berlin, Hamburg, Magdeburg, and other important places, of corn-grinding machinery purchased in this country. This is due, no doubt, to the fact that the rate of duty imposed upon ground corn and other corn preparations by the German Government is very high as compared with that levied upon the whole corn.

The good results of the corn propaganda, conducted at a comparatively slight expense by this Department, are most readily shown by reference to the figures of our export trade. So long as corn was used in Europe exclusively as cattle feed, its export from this country depended entirely upon the abundance of the crop and the corresponding depreciation in price, which made it cheap, even for that purpose only. Whenever the price was high, corn exports practically ceased. But if we compare the exports for the past fiscal year with those of 1890, the only year in which corn exports have been as great as in the year just elapsed, we find that whereas in that year the price at port of shipment was less than 42 cents, the price this year has been maintained at an average of over 55 cents, an advance of about 33 per cent. While it is possible that other causes may have had a part in effecting this result, still, unquestionably, it is very largely due to the earnest efforts made in recent years to introduce this cereal to the people of Europe as a suitable food for human beings, and the money value to the corn growers of the United States, represented by this enhancement in the price of export corn, represents on the exports of the past fiscal year over \$10,000,000.

I am gratified to be able to state that a very large interest has been awakened in other countries of northern Europe in regard to our Indian corn, the result no doubt of the discussion of the subject had in Great Britain and in Germany, and I shall hope, at an early date, to be able to carry on the propaganda in other countries as well as to maintain it in Germany and in Great Britain.

Congress has now awarded a more liberal, though still a very moderate, sum "to enable the Secretary of Agriculture to continue investigations concerning the feasibility of extending the demands of foreign markets for agricultural products of the United States," and I hope, therefore, to be able to push this branch of our work energetically during the present fiscal year.

REDUCTION IN COTTON AREA.

One of the gratifying features of our agricultural industry during the past year has been the marked reduction in the cotton area throughout the cotton States. One of the most difficult things to control in the agricultural industry is a fair ratio of product to demand. Every year of good prices tends to an overproduction the subsequent year, with the natural result of depression in prices, unless this be fortunately prevented by fortuitous conditions which no one can foresee or control. For the past few years the price of cotton has been extraordinarily low and the production so great that each year leaving a surplus over consumption produced finally such a plethoric condition in the market as to greatly discourage the cotton-growers. This unsatisfactory condition of affairs, however, was not without salutary effects; for it is evident now that a very considerable reduction in the area

planted to cotton has taken place, the result of a determined effort on the part of the growers to limit production and to turn a portion of their land to other crops. Anything which leads to a diversification of crops throughout the country, but especially in a section devoted for many years almost exclusively to the raising of one staple crop, is to be greatly commended.

IMPORTS OF RAW COTTON.

In connection with this subject, it is well that I should call attention to the great increase which has taken place of late years in our imports of raw cotton, imports which but a few years ago were hardly known. During the past fiscal year raw cotton was imported free of duty to the amount of \$3,215,303, as against \$2,825,004 for the year previous and \$1,392,728 for the fiscal year ending in 1890. The most of our imported cotton comes to us from Egypt, and is demanded by our manufacturers on account of the peculiar characteristics which it possesses and which are not to be found in our home-grown cottons. Some imports of cotton are also made from Peru, and I am informed, on good authority, that the entire supply of Peruvian cotton imported finds its way not into the cotton factories, but into the manufactories of woolen goods, its character being such as to make it specially available for mixing with woolen goods without detection. With a view to checking our imports of foreign cottons, especially the Egyptian, I have taken measures to undertake, with the coöperation of some of the experiment stations in the cotton States, experiments with a view to producing a cotton of home growth which shall serve as an efficient substitute for the Egyptian. I trust that in this we may be successful before the import-cotton trade increases to such an extent as to seriously affect our own cotton-growers.

CEREAL PRODUCTION AND PRICES.

As the time of the wheat harvest of 1891 approached it became apparent that there would be a heavy deficiency in the crop of certain European countries of large production and equally apparent that this country would be blessed by bountiful nature with a crop of exceptional proportions. These facts were seized upon and their importance so magnified by ordinary observers of commercial affairs that a large section of the people was led into the belief that an era of abnormally high prices for wheat was at hand. Under the effect of this belief, aided by a tendency among growers in this country to hold their wheat back, on the advice of superficial observers, there was an advance in price. The values reached were not maintained, because the wheat supply of the world did not justify them, and when the decline began it was accelerated by the increased receipts in our markets from garners which had been stored up to await the promised rise. The

effort to enforce an advance injured those engaged in it and resulted in further breaking prices when the movement began.

The error which misled our producers, by inducing the expectation of a rapid advance of their wheat to a high value, arose from a failure to appreciate the changed conditions which now surround the production and marketing of the world's wheat crop. The commercial supply does not depend entirely upon the crops of a few large countries. The ramifications of commerce are so extended and the facilities for internal communication so improved in the various countries of the world that a demand will draw a supply from sources little recognized a few years since in summing up countries of production. Again, improved commercial facilities make it possible to draw heavily upon the ordinary reserves without imperiling future supplies, reducing the amount which each country must hold on hand to meet possible future domestic requirements. By this improvement India and Russia are enabled to dispose of a large part of the grain which a few years ago was stored or pitted for years of scarcity. Thirdly, the wheat crop of the world is continuous, being harvested in every month of the year. There is no absolute line of demarkation of crop years, the production of one year lapping into the distribution of another, tending to an equalization of distribution and steadying of values.

Taking the world throughout, the fat crops more than equaled the lean crops, and there was actually more wheat grown in 1891 than in 1890. Superficial observers saw only the facts in a few leading countries where the crop was deficient, but the surplus in countries which they did not take into account was large enough to overthrow their theories. Even in Russia, where famine excited our sympathies and drew from the charities of this country enormous supplies, delivered free and distributed to the starving, the exports of wheat last year were 105,000,000 bushels, nearly as much as the average of the four preceding years and decidedly more than the average for ten years, and this in spite of the period when exports of wheat from that country were entirely suspended.

Wheat values did not advance to the figures which some predicted and many expected, because the world's supply was in proportion to the world's demands. The only abnormal condition was the unequal distribution. Neither the United States nor any other single country of however great importance can absolutely command the wheat market of the world. It is a staple production in too many countries easily accessible to modern commerce.

The time has arrived when the American farmer must cease his efforts to neutralize the low price of his wheat by producing a larger quantity. He is going from bad to worse, and each effort to extricate himself by that means sinks him deeper in the mire of failure. The only proper course lies in a reduction of acreage and production to meet the demand of domestic consumption and a normal requirement

for exportation. The conditions which have at last overwhelmed cotton-growers now threaten wheat-growers, and unless there is a speedy reduction by choice there will be a further parallel in a reduction by force of circumstances. But for the unusual conditions which last year prevailed in Europe our crop of over 600,000,000 bushels would have precipitated the crisis which is yet impending. So far as our own wheat-growers are concerned the remedy is in their own hands.

The beneficial effect of customs legislation affecting barley is apparent. Our acreage and production have largely increased, and our increased crops are disposed of at prices more remunerative than have prevailed during recent years. The domestic market, which has heretofore absorbed 10,000,000 bushels of foreign barley, is now reserved for the domestic product. The crop failure in eastern Europe resulted in a demand for our rye unprecedented in the history of our foreign trade. The demand was unusual and due to causes not likely soon to recur, but a trade was initiated which might be fostered and perhaps prove the nucleus for a permanent extension in our rye exports to proportions in harmony with our capability for the production of that grain.

The American farmer's hope of remunerative prices depends upon his gauging his areas in cultivation more closely to the normal demand, and not vieing in competition with the peasant and serf labor of the entire world. Something else is wanted besides wheat and corn, or cotton and tobacco. The farmer must find other outlets for his labor, or stop his plow and rest his hoe upon the border line of production which limits living prices.

DOMESTIC SUGAR INDUSTRY.

In regard to the sugar industry and its domestication in this country, there is nothing to add to what I had to offer a year ago on this subject beyond the fact that all the experiments conducted by the Department, both in the laboratory and in the field, and at the special experiment stations established for that purpose, confirm the hopeful anticipations I then expressed as to the possibility of this country, in course of time, supplying its own sugar. Enough has been done to show clearly that in various sections of this country either beet, sorghum, or cane sugar can be produced with profit to the grower of the crop and to the manufacturer, provided the conditions of culture and manufacture indicated in the special reports made by this Department on the subject shall be observed. The difficulties that exist are those of an economic character—difficulties which it seems evident that time and necessity will gradually remove. I shall submit further on, in a detailed review of the work of the Division of Chemistry, some interesting particulars in regard to this subject.

SCOPE OF THE DEPARTMENT'S WORK.

Before proceeding to detailed account of the work of the several branches composing this Department, I desire to present for your consideration some observations regarding the general character, scope, and object of the work of this Department, which I conceive to be not thoroughly understood, or at least not fully appreciated, by many people in this country. In order to fulfill its mission, this Department must be prepared to do with reference to agriculture all that our individual farmers are unable to do for themselves. The great blessing which this country enjoys from the fact that it is far less than some other countries the home of large landed proprietors presents to us certain difficulties which it is the province of this Department to remove. The absence of large land-owners, commanding extensive capital in our agricultural industries, necessarily limits the lines of individual experiment and investigation into those agricultural problems upon the solution of which the future prosperity of agriculture depends.

It is the duty of this Department to investigate all these problems, and in this work it is entitled to receive the heartiest coöperation on the part of the experiment stations in the various States which are recipients of the national bounty. But while the work of these must necessarily be differentiated, that of the Department must be broad enough to meet the wants of the entire country. Not only must the diseases of animals and plants and the ravages of their insect enemies be studied and investigated with a view to prevention or remedy, but the condition of soil and climate, rendering various sections specially adapted to this or that crop, must be thoroughly studied and understood. This Department must be prepared to encourage agriculture on certain lines in certain sections which are especially adapted to them, and, on the other hand, to discourage certain lines in other sections. Again, the farmer must always depend upon this Department for information in regard to what may be termed the commercial side of agriculture, the condition of crops at home and abroad, the question of the demand, and the question of the supply of all great staple crops, not only as to extent, but as to character. Only a thoughtful man, familiar with the conditions of agriculture in the country, can fully appreciate the vast breadth and scope of the work required to enable this Department to adequately fulfill the mission I have indicated.

The commission of this Department, as I may call the law under which it was originally established, is broad enough to cover any work which in the judgment of its Chief may have a bearing upon agriculture in this country; but in its practical application its work is necessarily limited by the extent of the appropriations made for its use, as well as by their distribution to special objects. While the appropriations which I have estimated for have been estimated upon the most economical basis adequate to carrying on the work already undertaken

with reasonable efficiency, I desire to state emphatically that a much larger sum could be spent to the very great advantage of agriculture in this country, and I will add that I know of no way in which the people of the United States can make a more profitable investment than by supplying the funds necessary to an ample enlargement of our work, and an extension of our facilities for the work already undertaken.

NEED OF ADEQUATE COMPENSATION.

In this connection I wish to point out that the Department labors under serious disadvantage from the inadequate compensation which it is authorized to offer to the men of talent, scientific education, and experience which it needs to carry on its most responsible duties. In this respect the Department's facilities will be found to compare very unfavorably with those of the other Departments of the Government.

There are in other Departments single bureaus commanding the services of a dozen men drawing salaries exceeding by \$500 to \$1,500 those paid to persons performing corresponding duties or having corresponding responsibilities in this Department. In all matters pertaining to agriculture this Department should lead and not follow in the footsteps of State or private enterprise, and I submit that without greater liberality in this respect, which will enable the Secretary of Agriculture to command the services of the best-equipped men in the country for his purpose, the Department will inevitably be relegated eventually to a second place unworthy of a National Department, and which will be sure to cripple its usefulness.

AGRICULTURAL GATHERINGS.

As I have had occasion to say in former reports, one of the objects which I have sought persistently to accomplish, but only with moderate success, has been the freer and larger intercourse between the Department and the farmers, by means of adequate representation at the principal gatherings of agricultural, horticultural, live stock, and kindred industries throughout the country. It is largely due to a lack of this representation that the coöperation in the interest of agriculture which ought to exist between the various bodies representing the several agricultural industries and the State boards and colleges, etc., does not obtain. What I have been able to do in this direction with the limited facilities at my disposal has brought about results most gratifying, and, at the same time, such as afford an earnest of what might be accomplished were the Department properly equipped with an adequate force of intelligent, energetic special agents, well acquainted with the agricultural interests in their own section of country, and qualified to represent the Department creditably on all public occasions. To reach its full measure of usefulness, it is essential that the Department be brought home to the farmers in such a manner that they will be made

to realize that it is their Department, and that they are acquainted with it and it with them.

REPRESENTATION ABROAD.

What has been done abroad in the interest of Indian corn shows very clearly the importance and desirability of having this Department represented in foreign countries. These representatives should be charged not only with the duty of spreading information abroad in regard to our own agricultural resources and the availability of our agricultural products for foreign use, but they should also keep this Department thoroughly informed in regard to all matters relating to agriculture and to the markets for agricultural products in foreign countries, by which our own producers could be enabled to compete with the foreign producers. To afford such representatives all the facilities they ought to have, and to secure harmonious coöperation between themselves and our diplomatic representatives abroad, they ought to be, on the recommendation of the head of this Department and with the concurrence of the Secretary of State, attached in a semiofficial character to our foreign legations in those countries where it may be found necessary to station them. Such a course has already been pursued with most satisfactory results in the case of the agent of this Department in London.

A RETROSPECT.

I shall offer no apology, in presenting to you this my fourth and last report as Secretary of Agriculture, for submitting for your consideration a brief retrospect of the work accomplished in the Department under the present administration. The passage of the law making the Department one of the Executive Departments of the Government antedated by but a few weeks your own inauguration and my assumption of the duties of Secretary of Agriculture. In consequence, the entire work of reorganizing the Department in accordance with its new dignity, and to meet the enlarged field of labor which I assume to be the most practical result of its elevation, devolved upon myself, with the assistance of the distinguished gentleman whom you selected to serve as Assistant Secretary.

In my first report I said: "It is to be assumed that when Congress in its wisdom raised this Department to its present dignity and made its chief a Cabinet officer the intention of our law-makers was not simply to add the luster of official dignity to an industry already dignified by the labor of its votaries, but to give it added influence and power for good in their behalf." It is with that sentiment ever in mind that I have proceeded in the discharge of the responsible duties imposed upon me. I may venture to recall the fact that the work of reorganization was made none the less arduous for the reason that the appropria-

tions at my disposal, not only for the fiscal year in which I assumed office, but for the fiscal year following, had been made for the Department under its old régime, no further provision being made for it as an Executive Department than the appropriation for the salaries of the Secretary and Assistant Secretary in lieu of the salary formerly paid to its Commissioner. A brief enumeration of the practical features added to the work of the Department since March, 1889, can not fail, I think, to satisfy the most exacting friend of agriculture of the earnestness with which I have sought to increase the utility of the Department and promote the interests of American agriculture.

My first step in the work of reorganization was to divide the Department into two grand divisions, one embracing all branches which involved administrative and executive features, which I retained under my personal supervision, the other embracing those branches engaged purely in scientific investigations, the immediate supervision of which I assigned to the Assistant Secretary. In accordance with this division my personal attention was devoted to the enlargement of the scope of work in the interest of practical agriculture, and particularly to three principal objects: The extension of the market for the disposal of the surplus of our great staple crops and of our vast animal products; the enlargement of our productive capacity with a view to substituting as far as possible home-grown for imported products; and to bringing the Department into such close relations with the farmers as would make them acquainted with our work, inspire them with confidence in our ability to serve them, and to impress more forcibly upon the responsible officers of the Department themselves the wants and conditions of the tiller of the soil.

The great enlargement of the scope of work assigned to the Bureau of Animal Industry, which resulted in compelling me to thoroughly reorganize it administratively a little over a year ago, has been especially marked along the lines of the first of these objects. The thorough control of contagious and other cattle diseases, involving a careful and systematic regulation of our cattle traffic, and achieving, I am glad to say, the complete eradication of the most serious of the diseases with which our cattle industry was threatened; the comparative immunity obtained from the ravages of Texas fever among Northern cattle, and the establishment of a great system of national cattle and meat inspection with the twofold object of guarding our cattle from the possible introduction of communicable diseases and of opening the markets of the world to our meat products—these of themselves furnish sufficient cause for congratulation as the work of one administration. The great results of this work and the benefits secured to our cattle-growers and the live-stock interests generally I have already sufficiently emphasized in this report.

The extension of our Division of Statistics so as to cover the agricultural resources of other lands, and the demand of foreign markets for

products which it was in the power of the American farmer to produce, marks another and important step in the same direction; and to this I may add the establishment of an efficient agency in Europe for the investigation of the feasibility of extending markets abroad for American agricultural products, which, for obvious reasons, as already explained, has been directed chiefly to the introduction of our Indian corn to the people of Europe as a cheap and economic substitute for other cereal foods. In the efforts for the substitution of home grown for foreign products in our own markets the development of a domestic sugar holds an important place, and it is, I am gratified to say, the work of the past three years in this direction which has placed our domestic sugar industry upon a footing which justifies and invites the extension of private capital and individual enterprise to its development.

The development of the fiber investigation from the point of simply gathering information in relation thereto to the extent of practical investigation and experiment has been accomplished, and affords marked encouragement for the hope that the time is not far distant when a large proportion of the enormous sum now paid to foreign producers for vegetable fibers and their manufactures may be diverted to the pockets of our own farmers.

Investigations into the resources of the Rocky Mountain region, together with the vast amount of information collected and published in regard to our facilities for irrigation both from surface and subterranean supplies, and extensive experiments in the production of grasses and fodder plants within the limits of the vast territory, embracing not less than 300,000,000 acres, outside of irrigable limits, and which, as I have shown, promise a reasonable degree of success, the value of which to the country can hardly be overestimated, and the important and highly satisfactory efforts made in the prevention or remedy for plant diseases and in checking the ravages of the insect enemies of plant and animal life—these represent fairly some of the more important work accomplished towards the development and extension of our own domestic production.

Of the twelve divisions of the work which I found in existence on assuming control of the Department, one which was then but a section of another division, Vegetable Pathology, has become a separate and distinct division, the importance and value of which has been widely recognized by horticulturists throughout the country, while one, the Silk Division, has been discontinued owing to the refusal of Congress to make the necessary appropriations therefor. Many new divisions have, however, been organized. One of these, it is true, the Office of Experiment Stations, had been called into being a short time before my assumption of office, under section 3 of the act of March 2, 1887, which established the State experiment stations. It had, however, practically just begun its work, and its entire organization and development has been a part of the work of this administration. Its utility as the con-

necting link between this Department and the stations and on behalf of the stations has been shown by the unanimity with which the directors and officers of the various stations have sought to have its appropriations increased; and while this has been done, so that to-day the appropriation for this branch of our work is twice what it was in 1889, its labors have been so far extended that the sum devoted from the printing fund of the Department to its work in the line of publications alone exceeds the original appropriations made for it.

The Division of Records and Editing is an entirely new division, and one which has had a large share in increasing the influence and the efficiency of the Department and at the same time in effecting much needed modification in its publications and exercising general supervision over its publishing interests so as to promote in a marked degree the advantageous and economic use of the printing fund. The increased appreciation of the character and utility of the Department publications has most fortunately led, in accordance with my repeated representations, to a large increase in our printing fund, the careful and economic administration of which, however, has been such as to secure a far more than corresponding increase in the number of our publications, to say nothing of the general improvement in their character, an improvement which has been especially directed to subserve the needs of the practical farmers of the country.

The work of the Division of Forestry has been so systematized and extended as to largely extend both the influence of the division itself and to awaken widespread and most gratifying interest among the people of this country in regard to the important subject of our forest resources, the preservation of our forest supplies, their condition and character, and the climatic influences of our forests, while, thanks to the enlightened initiative of the Chief Executive, important steps have been taken in the direction of administering many of the forest lands of the Government in accordance with the principles of economic forestry.

One of the most important additions to the work of the Department has been made in the transfer to it of the Weather Bureau, a transfer calculated to greatly extend the work of the Bureau itself for the benefit of agriculture and supplying opportunities for the much-needed coöperation of this branch of the service with the work of several of the other divisions of the Department—a transfer, indeed, which was absolutely essential in order to successfully conjoin studies of animal and plant life with that of the soil and climatic conditions, and, I may add further, a transfer which has elicited most gratifying evidences of general approval in all sections of the country.

To enumerate even a small proportion of the valuable publications issued during the past three years would be impossible within the limits of this report. They have been many, varied, and most useful to the agricultural interests, and, while the information to the practical

farmer has been, as I believe it ought to be, my chief care, the interests of scientists and the students of agricultural science have been by no means forgotten. Congress itself has shown a high appreciation of the value of some of these publications by ordering their reproduction in very large editions for distribution by Senators and Representatives, and I am gratified to be able to state that educational establishments and agricultural associations throughout the entire country have shown a steadily growing and keen appreciation of the publications of the Department and of their educational value.

In concluding this review of the work of the Department under your administration, I may properly say a word in regard to the earnest effort which has been made to administer its affairs with due regard to economy. References to great increase of the annual appropriations of this Department during the past two years have been not infrequent, but I think it will surprise those who have taken these references at their face value without much thought and consideration of the facts underlying them to learn that, after deducting the appropriation for the Weather Bureau, which was not an increase but a transfer, and the appropriations necessitated under the law endowing the State experiment stations, over which the head of this Department exercises no control whatever, the total sum remaining of the present year's appropriations barely exceeds the total appropriations of the Department, less experiment station work, for the fiscal year ended June 30, 1889. And this in spite of the fact that the present appropriation includes sums devoted to special features of the work not then in existence nor even contemplated, such as fiber and irrigation inquiries, extension of foreign markets, rainfall experiments, etc., to say nothing of the large sum necessarily devoted to the work of meat inspection. I will candidly admit that the restriction of the appropriations for the work of this Department within these narrow limits is not my fault, but I think that it is not unreasonable that I should take some credit for the accomplishment of the objects which I have enumerated within the limits to which I was restricted by a want of greater liberality on the part of Congress.

BUREAU OF ANIMAL INDUSTRY.

This year marks the successful accomplishment of the work undertaken by the Bureau of Animal Industry in 1887 and continued without intermission until the present time, in its struggles to effect the complete eradication from the United States of the disease known as contagious pleuro-pneumonia. It tells a story of what untiring patience and firm determination will accomplish, and it proves to the people of the United States that, in spite of all obstacles, oftentimes of unjust criticism, and of virulent opposition in some sections, our officers have succeeded in doing what at the outset was declared by many to be an

impossible achievement. So long a period has passed since the country was thrown into excitement by reason of the discovery of this disease in the great cattle centers of the West, and since its effectual eradication from that center, together with its confinement to a restricted area in the East, that even stock-owners themselves will perhaps fail to realize the importance of the work accomplished.

When we realize, however, the extent of the losses entailed in other countries by the existence of this disease and the well-nigh insurmountable difficulties which have attended their attempts to extirpate it, and when we appreciate, moreover, the benefits to our stock-growers from restored confidence in our export-cattle trade due to our immunity from this disease, and the evidence we have given of our ability to control diseases of cattle, the appreciation of the lasting value of the work accomplished by the Bureau since its establishment in this respect alone will certainly meet with very general recognition. From the introduction of pleuro-pneumonia into Great Britain up to 1869, England had lost, according to reliable estimates, almost exclusively from this disease over five and one-half million head of cattle, worth in round numbers \$400,000,000, and, judging by the records of the ravages of the disease in that country since that date, we may put the total losses, on a very conservative estimate, at \$500,000,000 in deaths alone, without counting the many contingent expenses in the way of deteriorated health, loss of markets and of progeny, disinfection, quarantine, etc.

In addition to all these losses, Great Britain paid out for a period of seven years expiring with 1890, the sum of \$1,624,737.06 for cattle condemned and killed on account of this disease; and yet, notwithstanding the restricted area of the British Isles and the energy in fighting the disease which such figures would indicate, there would seem to be a very general impression existing throughout Great Britain that eradication is hopeless, and that all the Government can accomplish is to limit the loss and damage by a more or less efficient control. We have no reliable statement showing the total cost to the British Government of the war which it is compelled to wage incessantly against contagious pleuro-pneumonia, the only figures available being those for the slaughtered cattle. Taking these figures, however, as a basis for comparison, the cost of the work of eradication in the United States has been very moderate. The total expenses, including the purchase of diseased and exposed animals, together with all salaries and traveling expenses and the various miscellaneous expenses connected with quarantining and policing the States in which the disease existed, have amounted to but \$1,509,100.72, being in round numbers \$115,000 less than the bare cost of the cattle killed by Great Britain.

The following is the text of the proclamation in which I made public the fact of the eradication of pleuro-pneumonia, and announced the raising of the quarantines heretofore existing in certain counties of the States of New York and New Jersey:

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY.

To all whom it may concern :

NOTICE IS HEREBY GIVEN that the quarantines heretofore existing in the counties of Kings and Queens, State of New York, and the counties of Essex and Hudson, State of New Jersey, for the suppression of contagious pleuro-pneumonia among cattle are this day removed.

The removal of the aforesaid quarantines completes the dissolving of all quarantines established by this Department in the several sections of the United States for the suppression of the above-named disease.

No case of this disease has occurred in the State of Illinois since December 29, 1887, a period of more than four years and eight months.

No case has occurred in the State of Pennsylvania since September 29, 1888, a period of four years within a few days.

No case has occurred in the State of Maryland since September 18, 1889, a period of three years.

No case has occurred in the State of New York since April 30, 1891, a period of more than one year and four months.

No case has occurred in the State of New Jersey since March 25, 1892, a period of six months, and no case has occurred in any other portion of the United States within the past five years.

I DO THEREFORE hereby officially declare that the United States is free from the disease known as contagious pleuro-pneumonia.

J. M. RUSK,
Secretary.

Done at the city of Washington, D. C.,
this 26th day of September, A. D. 1892.

The following table presents in summarized form the total of herds and cattle inspected in the several States, the post-mortem examinations made, the premises disinfected, together with the diseased and exposed cattle purchased and slaughtered:

Summary.

	Illinois.	Maryland.	New York.	New Jersey.	Pennsylvania.	Grand total.
Total number herds inspected	7, 551	30, 627	65, 192	51, 330	12, 251	166, 951
Total number cattle inspected	24, 344	306, 152	610, 754	421, 495	242, 976	1, 605, 721
Total number cattle tagged		33, 746	211, 109	68, 778	53, 333	366, 966
Total number post-mortem examinations	8, 979	33, 048	96, 422	40, 734	177, 221	356, 404
Total number diseased on post-mortem	354	1, 720	4, 321	954	89	7, 430
Total number premises disinfected ..	678	326	2, 161	840	123	4, 128
Total number diseased cattle purchased	176	1, 974	3, 347	844	63	6, 404
Total number exposed cattle purchased	999	2, 930	9, 019	2, 467	142	15, 557

NOTE.—To the items "Total number diseased cattle purchased" and "Total number exposed cattle purchased" are to be added the following purchases in States other than the above-named: Vermont, Massachusetts, Virginia, and District of Columbia 45 diseased animals, making a total of 6,449; Vermont, Massachusetts, Virginia, and District of Columbia 57 exposed animals, making a total of 15,614.

TEXAS FEVER.

The regulations made during the past year for the movement of Southern cattle for the purpose of preventing the spread of Texas fever was issued February 26, 1892, and were substantially the same

as those which governed the movement of Southern cattle during the season of 1891, with the exception, however, that the quarantine line was changed. The line was run so as to take in the larger portion of the Panhandle of Texas, which had been represented to the Department as being free of infection, and permitting cattle from one tier of counties to be moved into the States of Colorado, Wyoming, and Montana for feeding purposes. This was done at the earnest solicitation of the officers of these States. On June 13 the Department modified the quarantine line and these regulations, so far as they applied to the State of Virginia, by an order excluding the counties of Orange, Albemarle, Greene, Nelson, and Amherst from the infected area, and permitting the cattle from said counties to go north free of restriction.

On July 5 the permission granted for the shipment of cattle from certain counties in Texas, to Colorado, Wyoming, and Montana, for feeding purposes was extended, under the same conditions, to South Dakota. The regulations concerning cattle transportation have been as rigidly maintained as possible under the existing law. Notwithstanding these regulations, however, and the efforts made to compel compliance therewith, Texas fever has, to a modified extent, appeared in some sections of the country; but with one exception, in Kansas, the cases have been unusually few, and, as a rule, isolated. Large outbreaks, so often the rule in former seasons, have not occurred, and the cases found have been very few in number. One of the difficulties met with, notwithstanding the regulations, is that this Department is not able to follow cars of Southern cattle shipped and marketed for slaughter under the law to the various points to which they are consigned. A large corps of inspectors has been maintained at all the large stockyard centers at which Southern cattle are received, and, whenever possible, the authorities of States to which cars containing Southern cattle were destined have been informed of their shipment, so that they might deal with these market cattle in such a manner as to protect cattle interests in the localities to which they were consigned. In some instances, however, the State authorities have failed to enforce measures necessary to guard the movement of cattle from the cars to the slaughterhouse, and to this cause I attribute the occasional appearance of Texas fever in some localities.

I desire to renew my suggestion that legislation be provided to compel railroad companies to comply with our regulations for cleaning and disinfecting cars that have carried Southern cattle, and to provide penalties for the violation of the regulations made to insure the safety of the cattle of this country. If a law could be enacted to compel the use by transportation companies of cars for the sole use of Southern cattle, not to be used for transporting any other animals or merchandise during the fever season, and requiring such cars to be marked or painted with a distinctive color, so that they might be at once distin-

guished from other cars of the cattle traffic, it would go a long way towards preventing the spread of this disease.

INSPECTION OF EXPORT CATTLE.

This work has been continued under the provisions of the act of Congress of August 30, 1890, in the manner described in the last report made by this Bureau. The number of cattle inspected at the principal stockyards, namely, Chicago, Buffalo, Baltimore, Philadelphia, Indianapolis, and Pittsburg, during the fiscal year ending June 30, was 431,400. Of these the number tagged for export was 285,984. The number of steamships inspected for the year was 917, and the total number of cattle inspected and shipped from the ports of New York, Boston, Baltimore, Philadelphia, New Orleans, Portland, Norfolk, and Newport News, was 389,480, an increase of $7\frac{1}{2}$ per cent over the exports for the preceding year. The system of tagging, adopted for the identification of animals, lest any of these should arrive in Great Britain affected with disease, and which it might be desirable to trace to the place of origin, has been found perfectly effectual, and no difficulty is experienced, whenever necessary, in tracing the origin of any individual animal and locating it on the farm whence it was purchased.

The vessel inspection authorized under the act of Congress of March 3, 1891, has been continued in accordance with the regulations made under this act, June 6, 1891, to insure the safe transport and humane treatment of cattle in their voyage across the Atlantic. Of the whole number of vessels inspected (917) 382 sailed from New York, 240 from Boston, 153 from Baltimore, 78 from Philadelphia, 35 from Newport News, 5 from New Orleans, and 24 from Portland. The beneficial result of this inspection and of the enforcement of the regulations referred to is shown by the fact that for the fiscal year ending June 30, 1892, the percentage of loss of cattle in transit, including all causes, was but seven-eighths of 1 per cent, a considerable reduction from the percentage of losses for the year ending June 30, 1891, which was $1\frac{3}{8}$ per cent.

AMERICAN CATTLE INSPECTION IN GREAT BRITAIN.

The American veterinarians located at the foreign animals wharves at Great Britain by the courtesy of the British authorities have continued to inspect American cattle landed in that country. During the past year the British authorities have in four instances claimed to find contagious pleuro-pneumonia among our cattle. In each of these cases their diagnosis was disputed by the American inspector. In one of these cases, at least, the diagnosis of the American inspector, Dr. Wray, who declared the animal suspected of having contagious pleuro-pneumonia to be suffering simply from catarrhal pneumonia, was sustained by Profs. Brown and Duguid and Dr. Cope of the Royal College, after several days deliberation. In each case, as soon as the tag numbers

of the animals were received at this office, an investigation was undertaken to ascertain their history. Each animal was traced from the port of export, through the stockyards where tagged, to the farm upon which it had been raised, with the result that no disease was found on the farms from which the animals came, or among the animals with which they had come in contact, or in any part of the country through which they had passed en route to the port of export. The history of the animals, therefore, did not sustain the position of the English veterinarians, but was quite in accord with that of the American inspector.

It may be further noted that the same fact exists, as was stated in my last report, that these alleged cases of pleuro-pneumonia claimed to have been found by the British authorities occurred during the winter and spring months, at a time when cattle in course of transportation across the Atlantic are exposed to storms and severe cold weather, tending to develop lung trouble and pneumonia of a noncontagious character. The total number of cattle inspected by our veterinarians in Great Britain during the fiscal year was 368,014.

INSPECTION OF IMPORTED ANIMALS.

This work has been carried on under the provisions of the act of Congress of August 30, 1890, in the manner detailed in my last report. During the past year the outbreaks of foot-and-mouth-disease among sheep in Great Britain necessitated the suspension by this Department of the issuing of permits for the importation of this class of animals into this country. This suspension of permits is still maintained and will be so maintained until the Department is fully satisfied that this dangerous scourge has been thoroughly suppressed in Great Britain and there is no likelihood of its importation into this country. Some criticism has been made upon our refusing permits for the importation of sheep owing to this cause, and particularly from the fact that we refused permits after an official statement had been made by the authorities of Great Britain that this disease had been extirpated from that country. The wisdom, however, of the action of the Department in requiring a longer time to elapse after the alleged suppression of the disease was shown by the fact that the disease again broke out in Great Britain and appeared in several places.

The total number of cattle inspected under the act was 2,673; of sheep, 373,517; and 74 head of swine. Of the cattle, 2,001 were en route to Boston for export. This, of course, does not include imported live stock received at the quarantine stations on the seaboard.

MEAT INSPECTION.

At the time of my last report twenty-two abattoirs were having their products inspected under the regulations of the Secretary of Agriculture, made March 25, 1891. At the present time the number of estab-

lishments provided with meat inspection has been increased to thirty-eight, and arrangements are still being made to extend the inspection to other applicants.

The total number of animals examined under the regulations, both by ante and post mortem examination, and the products of which have been marked for identification in the manner prescribed by the regulations, was, for the fiscal year ending June 30, 1892, 5,076,929. Of this number 3,167,150 were cattle, 1,267,329 were hogs, 583,361 were sheep, and 59,089 were calves. There were 1,990,771 quarters of beef tagged for export and 8,160,625 for interstate trade, and 688,176 carcasses went to canning establishments. There were stamped and marked for identification, in accordance with the regulations, 797,707 packages of canned, salted, and smoked beef products. Out of the 3,167,150 head of cattle inspected 141 were condemned on ante-mortem examination and 1,914 on post-mortem examination, and 187 sheep were condemned on post-mortem examination. Out of the 1,267,329 head of hogs inspected microscopically there were found 25,899 animals affected with trichinæ, about 2 per cent of the whole number inspected.

Of the nearly 40,000,000 pounds of inspected pork products exported about 50 per cent has gone to Germany and the remainder to Belgium, Great Britain, Holland, France, Denmark, Norway and Sweden, Italy, and Spain, in quantities ranging from 7,000,000 pounds to Belgium, down to less than 5,000 pounds to Spain, and in the order of the countries named. It is very probable that the exports credited to Belgium and to England and Scotland find their way to the German and French markets, as these are forwarded to houses in both Belgium and Great Britain for orders from French and German merchants. I may state here that a preference has been shown among a certain class of customers in both the British and our own home markets for inspected products, these commanding, in some cases, from half a cent to 1 cent more in price than the uninspected. As regards the cost of meat inspection, it has amounted for the fiscal year ending June 30, to \$279,508.37. There has been a steady increase, of course, from month to month, as the number of establishments provided with meat inspection has been increased, and a further increase must be provided for in the future. Of other expenses entailed on the Bureau by the recent inspection laws, that for export cattle inspection, amounts, for the fiscal year above mentioned, to \$90,542.36.

ANIMAL INDUSTRY PUBLICATIONS.

During the first session of the Fifty-second Congress that body ordered a second special edition of the Report on the Diseases of the Horse for the use of Senators and Members of Congress. This edition, numbering 45,000, makes the total number of copies of this valuable work published amount to 185,000, in spite of which the supply available for distribution is already practically exhausted.

Two reports somewhat analogous in their character to that just mentioned, and relating to cattle and sheep, will be ready for distribution during the present calendar year. They will, I am convinced, be found fully as useful to cattle-growers and sheep-raisers as the Report on the Diseases of the Horse is to horsemen.

Another bulletin is just completed and ready for the printer. It covers the investigations carried on in the laboratory of the Bureau during the years covered by the present administration in regard to Texas fever, investigations which have resulted in some most important discoveries, especially to that phase of the disease which has so long been the puzzle of pathologists, namely, the manner of its communicability. These discoveries will have a most important bearing upon the feasibility of controlling the disease, and, it is hoped, of absolutely preventing its spread.

DIVISION OF STATISTICS.

The data collected in this division with reference to our domestic agricultural production indicate, as the result of the season of 1892, an agricultural production ample for the wants of 65,000,000 people of a higher standard of living than that of any other nation, and of a surplus of breadstuffs and meats, dairy products, cotton, and tobacco sufficient for a moderate supply of the requirements of foreign nations, with little danger of glutting markets and depressing prices. On the contrary, the adjustment of supply to demand promises to advance rather than to depress values.

The greatest of the products of arable cultivation—maize—which averaged 1,184,486,954 bushels in the decade ended in 1879 and 1,703,443,054 in that ended in 1889, an increase of 43 per cent, will produce only a moderate supply, insuring a much higher price than has ruled for the past year, and still sufficient, with the old corn available, for all its various uses, in all the protean forms of its secondary products. The planting was late, early development slow, yet the length of the season, the absence of frost in September, and a favoring temperature so counteracted the earlier influences of the season as to insure a medium quality and somewhat enlarge the expectation as to quantity.

It is eighteen years since this country won from France the first place in aggregate wheat production; last year the crop of the United States was nearly double the average production of France. The crop was by far the largest annual production of this best of food grains ever grown in any country of the world. The French crop of last year was only a few million bushels larger than our exportation. The Indian crop last harvested did not equal our exports, and no other country produced as much as the United States spared of its surplus. The crop of 1891 was not only the largest in aggregate, but the largest in yield per acre ever grown in the United States. While this yield was largely the result

of very favorable meteorological and soil conditions, it affords gratifying evidence that a wheat famine in this country is not imminent, that our soils are not deteriorating, or rate of yield of wheat declining.

The crop of the present year has been harvested in good condition, a medium rate of yield and a good breadth, affording a supply for consumption, and an exportation at least half as large as that of last year, and quite equal to that of any of the four preceding years.

The season was unfavorable for seeding of oats; excessive rains were a serious hindrance to early growth, and drought, rust, and blight were deleterious incidents of the late season, reducing the ultimate yield, which is therefore slightly below a medium figure. Good prices are assured for this valuable crop.

Barley, the only cereal, rice excepted, of which there has been a deficient supply in later years, promises a yield above the average, above that of 1890, but not equal to the large crop of last year. The increase of area, since 1890, has greatly reduced imports from Canada, enlarged the domestic market, and benefited the farmers from New York to Dakota.

The efforts of this division have been for some time directed towards a salutary reduction of the cotton area. These have this year been measurably successful, and prices have been slowly advancing since the investigation showing such a reduction to have been made. Further advance can only be prevented by a larger production than seems at present probable. The crop will be materially smaller than those of either of the two preceding years.

During the year the crop report has been separated from the general report of the Statistician as being more ephemeral in character and requiring more prompt issue than miscellaneous statistics. It is now sent to press on the 10th of each month, an edition of 20,000 issued, and at the same time a four-page synopsis of the same, with an edition of 125,000 copies, especially intended for the information of farmers and issued in advance of the full report, in part usually mailed on the 11th, containing the results of an investigation on two continents perfected from the forwarding of primary data to issue of coördinated results in ten days, probably the speediest execution of official investigations of equal breadth in any country.

During the past year much labor and effort have been expended in obtaining material for a history of prices of agricultural products. A part of this investigation has been made at the request of the Finance Committee of the Senate, including monthly prices for June, 1889, to September, 1891, for primary markets in each of the States, and quarterly prices of the principal farm products in New York, Cincinnati, and Chicago, for fifty years.

New editions have been issued of the Albums of Agricultural Statistics, cartographic illustrations in chromolithograph of the more important results of original work in statistical investigation, which have

found favor in all grades of educational institutions, from primary schools to universities, and in popular libraries.

No small amount of labor has been necessary in satisfying the requirements of international courtesy, through foreign governments and representatives of foreign institutions and interests, for information concerning the resources and productions of this country, and for our methods of crop-reporting, which have commanded the attention and excited the admiration of foreign officials and editors.

A special section has been established in the division for the collection and distribution of information calculated to enlarge our exports of agricultural products to the countries of Latin-America, which, in accordance with the letter of instruction ordering the same, shall be devoted especially to an investigation of the character, extent, and prices of the imports into Mexico, the Central and South American States, and West Indies of agricultural products such as are or may be grown in the United States, and to the feasibility of extending our exports of agricultural products into these countries, the requirements of their markets, and the best methods of extending this trade.

DIVISION OF CHEMISTRY.

Investigations with sugar-producing plants have been carried on at four stations and in the laboratory of the division. During the spring of 1891, fifteen thousand packages of sugar-beet seed were sent to about eight thousand farmers in all parts of the country. Accompanying the seed were directions for planting and cultivating the same, and taking samples for analysis. Franks were sent for returning the analytical samples to the laboratory for examination. Several thousand samples of beets were received in this way from all parts of the United States, chiefly from the central northern States of Iowa, Wisconsin, Michigan, Indiana, Nebraska, and North and South Dakota. As the beets were analyzed a report of the character of each was sent to the person from whom the sample was received. All the analyses were tabulated by States and counties and published with the average for each State in Bulletin No. 33. While there is considerable value attached to investigations of this kind, they fail to disclose the true possibilities of any locality for the production of sugar beets. This failure is due to many causes, the chief of which are the lack of attention to details on the part of the farmers growing the beets, lack of care in sampling them, and deterioration of the beet from the time of harvesting until it reaches the laboratory for analysis. Much more accurate results are obtained by studying the possibilities of sugar-beet culture in a station established especially for that purpose. In many States such stations have been established, notably in Iowa and Nebraska.

The work of the Department, carried on at a station, was conducted at Schuyler, Nebr. Different varieties of sugar beets were planted at

this station, carefully cultivated, and systematically sampled and analyzed. The results were in a high degree satisfactory. An average yield of 21 tons per acre was obtained, with an average percentage of sugar of about 13. Considering that this was the work of the first year, the results are gratifying. During the present summer this series of experiments has been continued at the same place and the results, in so far as known, bear out the favorable reports of last year's work. In addition to the work in the culture of the beet during the past summer, special experiments have been made in the production of native-grown beet seed at the Schuyler station. Typical beets were preserved during the winter in silos, and in the early spring were subjected to analysis and classified according to their sugar content. All those showing 12 per cent or less of sucrose were planted together as one class; all those showing from 12 to 14 per cent were planted as the second class, and those above 14 per cent as a special class. Seed from all these varieties has been harvested. The seed from the first class will be used for general planting for the production of beets for manufacturing purposes, while that from the second and third classes will be used for the propagation of special varieties of beets rich in sugar.

Work in the improvement of sorghum cane has also been carried on experimentally with most favorable results, both at Sterling and Medicine Lodge, Kans. The results of the present season, which are not yet all tabulated, are sufficiently abundant to show that the method of scientific selection which has been pursued is still successful in establishing standard varieties of sorghum very rich in sugar and suitable for manufacture. It seems somewhat strange that with a plant which has been developed as the sorghum has been under the careful work of the Department, capital has not been forthcoming to apply practically the principles which have been established. There yet remains, however, to be established a first-class sorghum factory in a locality favorable to the growth of sorghum, capable of demonstrating the high commercial value of sorghum as a sugar-producing plant. It is believed that the extremely favorable results of this year's work will demonstrate to men of capital the practicability and possibility of investment in this industry.

Experiments have also been commenced and continued in Florida, on the peat soil, recovered by drainage, in the cultivation of sugar cane as a sugar-producing plant. The experiments, however, are yet in their infancy and the results are not definite. Many obstacles have been met which have retarded the success of the experiments; chief among them are the ravages of insects, cane borers, etc., on the crop. It is believed that these pests are now under control, and it is expected that the present year's work, which will be finished in January or February of next year, will show definitely the great possibilities of this locality for sugar production.

The work in the investigation of food adulteration has been pushed

forward with vigor. The amount of chemical work which has been done on this subject is perhaps the largest of any similar chemical work anywhere in the history of science. Since the last annual report two additional parts of Bulletin 13, devoted to food adulteration, have been published, viz, Part 6 devoted to the investigation of the adulteration of sugar, molasses, and honey, and Part 7 treating of the subject of the adulteration of tea, coffee, and chocolate. The results of these investigations have been of the greatest practical interest. In the case of sugar it was found that there was practically no adulteration. With molasses almost all the fancy brands were found to be adulterated with glucose. With honeys, over 45 per cent were found to be adulterated with glucose. Teas were found to be faced with mineral and coloring matters, so that poor and spent leaves would have the appearance of the best article. Coffee was found to be adulterated even in the berry by artificial grains and in the ground state largely by chicory and other cheap substances. Chocolate was found largely mixed with sugar and starch.

The general results of the investigations show the great extent to which the American consumers are cheated in buying foods of the character noted above, emphasizing the necessity of some national law by which the exportation of adulterated articles of food from one State to another can be prevented. The work is continued at the present time and investigations are now making on canned foods, both vegetables and meats, all kinds of preserved foods, and on flour, bread, biscuit, and cakes. These investigations will be pushed forward as rapidly as possible, and it is hoped that the publication of the results may be secured before the issuing of another annual report.

The miscellaneous work of the division has not been of any great public importance. It has consisted in the analysis of numerous samples of soils, fertilizers, and miscellaneous food products. Such work is undertaken for the benefit of individual farmers or communities, and not in the pursuit of any systematic method of investigation.

The needs of a special laboratory of much larger dimensions than the one occupied are very much felt, as the crowded condition of our building will show. In general, the work of the division has been satisfactory, the different members having been industrious and efficient, and the work has been done in a manner satisfactory to all concerned.

DIVISION OF ENTOMOLOGY.

The investigations of this division have been carried on under the unavoidable disadvantages resulting from a considerable reduction in its annual appropriation. Within the limited directions, however, the results obtained have been important.

The correspondence has comprised upwards of 4,000 letters, exclusive of many answered by circular, and the branch of the work con-

sisting of the examination and determination of species for station entomologists and others doing original work has been particularly extensive. Some 4,000 species have been examined and named in this way.

On the whole, the year has not been marked by very great damage from insects injurious to agriculture, but a number of species have been investigated and discoveries of practical importance have been made.

The anticipations of the Entomologist regarding the nonabundance of destructive locusts or grasshoppers the present season, as indicated in my preliminary report of last year, have been fully verified. The energetic work of last season and the present spring in Minnesota and North Dakota has resulted in the practical stamping out of the swarms of the Rocky Mountain locusts which settled there last season, while of the local or nonmigratory species, many of which did great damage in restricted portions of the country last summer, little has been heard the present season except in limited parts of southern California, a result due both to the great increase of natural enemies and to wet weather at critical periods in the life history of the insects.

The agent of this division sent to Australia in coöperation with the California State board of horticulture, for the purpose of collecting and sending to California insects which might possibly prove of benefit to the horticultural and agricultural interests of the Pacific slope, remained abroad for about one year, and during that time forwarded to California a very large number of living predaceous insects, the most important of which are enemies of the red scale, the black scale, and the woolly root louse of the apple. These insects have been received and colonized at Los Angeles and other points in California by another agent of the division. The present outlook is only moderately promising. The newly imported insects do not breed as rapidly as did the *Vedalia cardinalis*, which was imported three years ago for the purpose of exterminating the white or fluted scale, and it seems probable that there will be no repetition of the astonishingly beneficial results produced by the *Vedalia*. The importation of these new insects has caused a division of opinion among California horticulturists, some urging the futility of further remedial work until the new importations be given a chance to multiply and destroy the destructive species; others urging that it would be suicidal to abandon spraying and fumigating until it has been proved upon a small scale that the Australian insects will accomplish the results hoped for. Wisdom dictates a middle course, such as the reservation of certain orchards for the uninterrupted experiment with the Australian introductions, while the ordinary insecticide means continue to be pushed for the protection of orchards generally.

Three successful sendings of *Vedalia* to other countries in which the fluted scale has not yet succumbed have been effected during the year. These have included Cape Colony, South Africa, Egypt, and New Zea-

land. In Egypt they have been found to breed rapidly and to prey upon a destructive scale insect congeneric with the fluted scale of California. In New Zealand such good results have been accomplished as to elicit resolutions of thanks and appreciation at a meeting of fruit-growers held at Nelson in July.

It seems probable that the importation of the European parasite of the Hessian fly, referred to in my last report, will result in benefit to our wheat-growers, although it may be some years before the presence of the introduced parasite in numbers is made manifest.

An important result of the work of the season is the discovery of the eggs of the American ox bot, and the confirmation of the hitherto unproved theory that the young maggots do not burrow directly into the skin, but find their way to the points from which they emerge when full grown by means of the mouth, the œsophagus, and the subcutaneous tissues of cattle. The interesting fact is also settled that the ox bot fly of Europe does not occur in this country.

Several new importations in the way of injurious insects have been investigated, among them a small moth whose larva damages potatoes both in the field and when stored, and a new scale insect infesting the olive. It is hoped that by timely information and warning the spread of these undesirable immigrants may be averted. A careful study has been made of the life histories of the pea and bean weevils and a number of interesting, practical, and scientific points have been ascertained.

The records of the division indicate that the life histories of two hundred and fifty new or nearly new insect pests have been studied to a greater or less degree during the year. One of the most interesting of these is a caterpillar which attacked the sugar beets at the Department experiment station at Schuyler, Nebr. Experiments have shown, however, that it is rapidly destroyed by arsenical poison.

The investigation of the bollworm has been completed. A number of new facts have been ascertained and experiments have proved that while contagious germs can not be practically used in the case of this insect, feeding as each individual does in an isolated manner, trap crops may be used practically with the best results.

Efforts have been made to introduce a fungous disease of the European white grub and to use it against the American white grub, which is related, although differing both specifically and generally. The spores of this fungous disease are on sale in France and several tubes were sent to this country and tested by the Entomologist in the laboratory at Washington and in the field at Ames, Iowa, and Lincoln, Nebr. In one case only the grubs were successfully inoculated, the disease appearing and the insects becoming covered with the fungus. At the present time, however, no evidence of transmission from such grubs to others not treated directly has been found, even when those inoculated were confined in the same breeding jars with healthy grubs. The life

histories of our different white grubs have also been studied. This is a part of a series of observations begun last year and which will require at least three years for completion.

The work in apiculture continued up to the 1st of July. Up to that time, however, several important experiments had been made, including experiments in the evaporation of honey by artificial apparatus tending to prove that this can be done profitably; experiments in planting for honey showing that this process does not pay; the feeding of extracted honey for the production of comb honey, and several others of almost equal importance.

The publications of the division during the year have been, in addition to the regular issue of *Insect Life*, a bulletin consisting of reports of observations and experiments in the practical work of the division, and another presenting reports on the damage by destructive locusts during the season of 1891.

DIVISION OF BOTANY.

During the year large additions have been made to the National Herbarium under the care of this division. Not less than 12,000 specimens have been mounted and labeled, and distributed into the permanent collection. Fifteen thousand specimens have been distributed to the herbaria of the experiment stations and colleges of the several States. Altogether, more than 50,000 specimens have been secured through the collectors employed by the division, or by exchange. The publication work of this division during the past year has been important. It has included the second part of a *Manual of the Plants of Texas*, which will be found a convenient and helpful work in determining the plants of this region. There was issued also the first part of a *Monograph of Grasses*, a work which will contain descriptions of all the known species in North America, of which there are nearly 800. Several other valuable bulletins have been issued specially helpful to botanists.

Considerable attention has been given to the study of weeds, especially of some varieties recently introduced into this country from abroad. I may mention in particular the so-called Russian thistle, introduced some years ago into the Northwest, and which has in some sections, especially in the two Dakotas, created the greatest apprehension among the farmers. Its ravages have indeed assumed so serious an aspect that I thought it proper this year to direct a special agent of the Department to proceed to the infested section and study its character and habits, with a view to the issue of a practical treatise showing what can be done and what ought to be undertaken in order to effectually get rid of this pest. It was fully described and figured in my last annual report.

The Botanist, Dr. George Vasey, was last August commissioned as the joint representative of this Department and of the Smithsonian In-

stitution to attend the Botanical Congress held at Genoa, Italy, in connection with the Columbian Quadro-centennial celebration in that city. The congress was of an international character, and considered many important questions relating to the science of botany.

The experiments in relation to grasses, forage plants, and cereals at Garden City, Kans., under the direction of this division, have this year been remarkably successful, and show conclusively that, in the semi-arid regions of western Kansas and Nebraska a good average success in farming can be obtained if the methods be followed which have been thoroughly tested at this station. From 20 to 30 acres of excellent pasture and meadow grasses are now growing, which have yielded 2 tons per acre the present season. Thirty bushels per acre of a grain called Jerusalem corn has been obtained, which is fully equal to maize for fattening of hogs and cattle, and is good also as human food. Excellent crops of several early varieties of wheat and rye have also been secured. Several hundred bushels of these grass and grain seeds will be distributed to farmers in that region. Experiments in the same line have been conducted in connection with several experiment stations in the western States.

DIVISION OF ORNITHOLOGY AND MAMMALOGY.

During the past year the work of the division has been carried on as heretofore under two heads, (1) investigations relating to the geographic distribution of species, and (2) the collection of information concerning the economic relations of mammals and birds to agriculture.

A special effort has been made to publish the bulletin on hawks and owls, which has been ready for the printer several years, but could not be issued earlier owing to the expense of the colored plates. The appropriation for the division is too small to admit of carrying on the customary biological survey and at the same time to pay for these plates. Hence, in order to bring out this important bulletin, the survey has been suspended temporarily and all available funds have been used in the reproduction of the plates, all of which have now been engraved. The text is in the hands of the Public Printer and it is hoped that the work will be ready for distribution before the end of the year.

Colored drawings have been made to illustrate two bulletins on the pocket gophers and spermophiles or prairie ground squirrels of the Mississippi Valley, in the preparation of which the division has been engaged for some time, and the latter will be ready for distribution as soon as the plates can be put on stone.

The division has been somewhat crippled by the circumstance that its chief, Dr. C. Hart Merriam, who was appointed by the President as one of the two Bering Sea Commissioners for the United States (in connection with Prof. T. C. Mendenhall, Superintendent of the Coast Survey), has been so fully occupied with the duties incumbent on that position that he was able to give but little time personally to the work

of the division until August, for which reason the report of the biological survey of southern California and Nevada made last year, and known as the Death Valley Expedition, has been delayed several months. It is now, however, nearly ready for the printer, and will probably be published early in the year. Several additional points in central and southern California have been visited by a field agent for the purpose of supplementing and completing the work undertaken by the expedition. Nearly all of the enormous collections brought together by this expedition have been worked up, in which labor the assistance of several naturalists of world-wide renown has been rendered without expense to the Department.

The most important field work of the year has been done in the Lower Sonoran and Austroriparian zones, comprising the arid and humid parts of the Southern States from eastern New Mexico, Texas, and Indian Territory to Georgia. This area is of great importance from an agricultural standpoint, since it includes the cotton, cane sugar, and subtropical fruit-producing districts of the Gulf States. The special object of the work was to ascertain the northern boundary of this belt and to determine the species of animals and plants by which it is characterized and the conditions required for their existence. This had already been done in the southwest by Dr. Merriam, who last year traced the northern limit of the Lower Sonoran zone from Arizona to California. The task of continuing the work through the South Atlantic and Gulf States was assigned to Mr. Vernon Bailey, chief field agent of the division. With this end in view Mr. Bailey and his assistants visited many points in Mississippi, Louisiana, Texas, Oklahoma, Indian Territory, Arkansas, southern Missouri, and western Tennessee and Kentucky, and data have been secured by which the line in question can be determined with much greater accuracy than has been possible heretofore.

In order to ascertain more completely the affinities of the Lower Sonoran region, which includes large portions of California, Nevada, Arizona, New Mexico, and Texas, as well as the table-lands of Mexico, a field agent was sent to western Mexico early in the year to study the relations of the fauna and flora of this region to those of the adjacent tropical region along the coast. The results of this work are likely to prove of considerable importance, and the collections already received contain many interesting and valuable specimens.

During August and September Dr. Merriam made a brief biological reconnoissance of the higher portions of the southern Alleghanies, visiting Roan Mountain and Mount Mitchell and ascertaining the important fact that the subalpine fauna and flora do not reach these mountains, their southernmost outposts in the eastern United States being in the Adirondacks and White Mountains. Field work was also done in the States of Georgia, Alabama, Tennessee, Kentucky, Illinois, Iowa, Kansas, Nebraska, Arkansas, and southeastern New Mexico.

SECTION OF ECONOMIC RELATIONS.

Studies have been made during the year of the food and economic status of many species of birds of prey, crows, jays, blackbirds, woodpeckers, cuckoos, kingbirds, and horned larks. In addition to this work, special attention has been paid to the distribution, habits, and means of exterminating the several species of gophers and spermophiles of the Great Plains, Gulf States, and Mississippi Valley, and the information obtained has been incorporated in two illustrated bulletins on these species, now nearly ready for the press.

The work on crows has received constant attention, one or more assistants being occupied most of the time in examining stomachs of this species alone and in tabulating the results. Nearly 600 crow stomachs have been examined since the beginning of the year, and, with the exception of the insect material (now in the hands of the Entomologist), the results have been prepared for publication. As soon as the Entomologist's report is received the bulletin will be ready for the printer.

About seven hundred blackbird stomachs have been examined since January 1, and most of the material for a report on the crow blackbird is now at hand and being shaped for publication. Small lots of the stomachs of woodpeckers, horned larks, and a few other species have been examined for the settlement of special questions referred to the section, and, in connection with the exhibit for the World's Columbian Exposition, studies of the food of cuckoos, kingbirds, cedar birds, and some other species have been undertaken.

More than 1,900 bird stomachs have been received during the year, and about 1,600 have been examined during the same time. The collection now numbers 15,618 stomachs. The reference collection of seeds and other things likely to be found in bird stomachs has been considerably augmented, and many slides have been prepared for the microscope.

Considerable time has been devoted by the division force to the preparation of a suitable exhibit in order to illustrate the work of the division at the World's Columbian Exposition.

DIVISION OF FORESTRY.

Appreciation in the work of this division is rapidly growing, as is attested from the increasing correspondence and frequent references to and reprints from its reports appearing in technical and other publications. While this is gratifying, a much greater interest among our people is to be desired in order to bring about what is most needful, namely, a radical change of our present forest policy in all parts of the country. In order to stimulate this interest the method pursued in the division has been not only to present the general subject in reports, bulletins, and addresses, but also to exhibit existing wasteful practices in particular lines of business which rely on forest resources, showing the needs

and the means of improvement with the necessary technical detail, thus enlisting the good will of such business interest in the general movement for better forest management.

There are so many business interests of importance closely dependent on forest supplies that with the limited appropriations allowed for the Division of Forestry it is impossible to meet the growing demand for special studies of this nature. Thus, the tanning industry, which will probably be the first to experience a dearth of raw material, demands an investigation into the value of tan extracts and additional sources of supply when hemlock and chestnut oak bark are exhausted. The wood-pulp industry is waiting to have suitable and cheaper supplies pointed out, to be utilized in addition to the more valuable timbers which form now its source of raw material. Both of these investigations are planned for. The railroad interest has been satisfied by the exhaustive study of the adaptability of metal as a substitute for wood in ties.

The largest share of the energy and the greater part of the funds of the division are now devoted to a continuation of the exhaustive examination and tests of our important timbers, which was announced and outlined in my last report. The object of this work is not only to establish more accurately the properties of these timbers, but especially to find the relation, if any, between these properties and the anatomical structure as well as the conditions under which the tree has grown. The first preliminary report from this work was published during the year in Bulletin 6 of the Division of Forestry as one of the series under the caption of "Timber Physics," and has met with unusual appreciation by civil engineers, architects, builders, lumbermen, and others concerned in using timber. A progress report, now preparing for the printer, will record the results obtained for the longleaf pine of the South, and will more fully show the influence which the practice of turpentine orcharding has upon the quality of the timber. The outcome of this special series of examinations, which must remove the prejudice now existing among Northern consumers against the product of thousands of square miles of Southern timber lands, will at once demonstrate the high economic value of the work.

I regret that the limited appropriations at my command will not permit me to respond to the many calls from all sections of the country to have their timbers included in this examination without delay.

A bulletin discussing the influence of forest areas on climate, as exhibited by the long-continued observations at the German forest meteorological stations and by other records, is ready for publication. The revision of the nomenclature and check list of our arborescent flora is nearly completed, and will probably be ready for the printer before the end of the year, while the long-delayed publication of the biological monographs of our important conifers is also expected shortly.

Reports on the following subjects, "Statistics" and methods of char-

coal production" and "Statistics of mine timber and methods of timbering," are in preparation.

The ever-growing correspondence of inquirers, asking for information on a multiplicity of subjects having more or less close relation to the subject of forestry and the use of forest materials, occupied a large part of the time of the office force. Sometime has also been taken up by the work for the Columbian Exposition.

The value of advice which might be derived from the Division of Forestry by other Departments found expression in a call by the Hon. Secretary of War for plans of management of the woodlands in the Chicamauga National Park, and by the Board of Governors of the Soldiers' Home in this city for coöperation in improving landscape effects and enlarging the educational value, as an arboretum, of the grounds of that institution.

Although as a nation we must still acknowledge ourselves far behind all European nations in the practice of forestry, the last two years have seen such advance of public opinion in behalf of a more rational forest policy that we may expect soon to see a change in the treatment of our forest areas. This advance may be claimed as due in a measure to the exercise of the executive prerogative in withdrawing from disposal and permanently or temporarily reserving certain tracts of public timber lands in Colorado.

DIVISION OF VEGETABLE PATHOLOGY.

The laboratory work of the division has been pushed forward as rapidly as the time and means at hand would permit. Work on pear, apple, grape, and peach diseases has been under way. Considerable attention has been paid to diseases affecting plants under glass, especially lettuce, tomatoes, and cucumbers. A fact which becomes more apparent each year is the absolute necessity for thorough physiological and anatomical work as preliminary to the study of any plant disease. Plant physiology alone is a subject of vital importance to agriculture, and for this reason, if for no other, it well merits the earnest attention of the division, and whatever equipment may be needed for the study of these highly important subjects will, it is hoped, ere long be forthcoming.

Since my last report the investigation of the diseases of citrous fruits has been diligently prosecuted. A special agent of the division has carried on studies at various points in the heart of the orange region of Florida. The results of the preliminary studies of this year confirm the views expressed in my last report as to the serious nature of the diseases and the urgent necessity of a thorough study of them. Already the damage from one of the maladies is estimated at over \$1,000,000. As the diseases are of the most obscure nature, they demand that the investigations be carried out on the ground by trained men furnished

with the best equipment. Experiments bearing on the possibly contagious character of several of the diseases are already well under way. Others on the effect of various methods of cultivation, fertilization, and spraying are being carried out. From the importance of the subject it has been deemed best to establish a station for the study of citrous diseases in Florida. Two special agents have been detailed for the work and will give their whole time to the subject and to such other diseases as can be studied only in the far South.

The special agent assigned for duty in California has continued his investigations of the vine disease which has prevailed so destructively in the southern part of the State during the past few years. A report on the subject is now ready for distribution. In addition to the work on the vine disease, the agent has had under investigation a number of maladies affecting fruits, among which may be mentioned the shot-hole fungus of the almond, the souring of figs, blasting and blighting of grape flowers and fruit, etc. The shot-hole disease of the almond has been successfully prevented the past season at very little expense. This is one of the most troublesome diseases of the almond, and a cheap and effective means of preventing it will be of great service to the fruit-growers of the Pacific slope. The souring of figs is another troublesome disease which gives promise of being successfully prevented.

The pear-blight investigations, to which reference was made in my last report, have been continued during the year. In addition to the laboratory work, experiments were carried on in the field with a view of ascertaining the possible methods of infection and the effect of different compounds on the germ causing the disease. A series of feeding or fertilizer experiments was inaugurated in Virginia, to test the effects of various forms of plant food on the pear tree, in its relation to blight, to other diseases, and to fruitfulness. It was found during these experiments that spraying with Bordeaux mixture would afford almost complete protection from leaf-blight, a destructive fungous disease which prevails more or less seriously all over the country.

The work along these lines has led to an extensive series of experiments on the pollination of pear and apple blossoms. It has been proved that the majority of our cultivated pears, including such well-known varieties as Bartlett, Clapps Favorite, Lawrence, etc., are incapable of self-fertilization. The utter unfruitfulness of one orchard of 20,000 Bartletts was traced to this cause. By top-grafting and planting other varieties it is believed that this orchard can be made to fruit at comparatively little expense.

In the work on peach yellows, a bulletin has been published demonstrating the communicable nature of the disease; the experiments with fertilizers have been completed and the results prepared for publication. The question of immunity has received further consideration, and a brief report giving the result of experiments and observations on this subject will be prepared for publication during the winter.

The orchards of western New York and western Michigan have been reëxamined with special reference to the effect of restrictive legislation, and the agent in charge is now engaged in microscopic and bacteriological examinations. The disease still prevails destructively in certain sections of the country, and it is very important that scientific study should be prosecuted without interruption.

The field experiments and laboratory investigations inaugurated in 1891, in coöperation with the New York State Experiment Station at Geneva, have been continued with some slight modifications. The work has clearly demonstrated the possibility of largely preventing the leaf-blight of quince, pear, plum, cherry, and other nursery stock. Aside from the main work with nursery stock, extensive investigations of apple and pear scab have been in progress. One result of this work has been the discovery of the scab fungus on the unopened flower buds, a fact long suspected but never before demonstrated. This knowledge will modify the treatment of the disease to a considerable extent. A fungous disease, which has been in use in New York State for a number of years as a means of destroying a troublesome weed known as "live-forever," has received some attention. The possibility of growing large quantities of the fungus in artificial media and disseminating it among the farmers for distribution over their fields is being studied.

An extensive experiment, having in view the prevention of rust in wheat and oats, has been in progress during the year. The work was carried on in Maryland and Kansas, two special agents in different localities of the latter State being engaged in the investigations. The work was in a measure preliminary; yet notwithstanding this fact much time was consumed in laborious field tests which involved soil and seed treatments separately and combined, spraying at various intervals with numerous fungicides, and other lines of work. The results of the work are now being prepared for publication.

The question of fungicides has received special attention during the year. The present number of really valuable remedies or preventives of plant diseases is limited to half a dozen preparations. All of these are open to one or more objections, the most serious being the matter of cost. In the hope of obtaining some information of value along this line, twenty-five preparations which had been under investigation in the laboratory for some time were tested in the field during the growing season. Several of the preparations not only proved worthless as preventives of fungous attacks, but utterly destroyed the leaves, flowers, and fruit as well. A number of the compounds, however, give promise of being improvements on the old ones, especially in the matter of cost and ease of preparation and application. The work will be continued another year. Meanwhile, the results of the present season's investigations will be prepared for publication.

OFFICE OF EXPERIMENT STATIONS.

The duties of the Office of Experiment Stations may be divided into two general classes. On the one hand, it examines the work of the stations with reference to its general character and practical usefulness, in order that the Department may be prepared to report on the progress of the enterprise and to supply information of the results to farmers and others throughout the country. On the other hand, it collects and publishes data regarding the researches in agricultural science carried on in this and other countries in order that the stations may know what is going on in the lines in which they are working, and thus may be able to pursue their investigations with the greatest economy of time, labor, and money.

In the performance of its duties of the first class, members of the office force have, during the year, visited various stations and attended meetings of station workers. An extensive correspondence with station officers has also been carried on. The requests for information from farmers and others have been more numerous than ever, covering a wide range of subjects.

The third volume of the Experiment Station Record has been prepared and published during the year. This publication is designed to supply concise and timely accounts of the methods and results of the work of the stations, together with abstracts of the reports published by this Department, and of the more important publications of similar work done in foreign countries. The space devoted to accounts of foreign work has been greatly enlarged, with a view to more thoroughly acquainting our station workers with what is being done in those countries where scientific researches relating to agriculture have been longest in progress. A carefully prepared index has been issued with this as with the previous volumes of the Record. The amount and variety of the literature issued by the Department and stations make its orderly arrangement in a publication like the Record a matter of importance second only to the original work. Many testimonials regarding the usefulness of the Record have been received.

As a permanent and extensive means of reference to the literature of the stations and kindred institutions, a printed card index has been begun. A number of installments of this work have been furnished the stations and agricultural colleges. The value of that portion of the index already issued has been so clear that there is a general and very urgent demand for its continuance.

The other publications of the office have been numerous. The following merit special notice:

The compilation of analyses of American feeding stuffs, prepared by Messrs. Jenkins and Winton, of the Connecticut State Experiment Station, presented the results of more than 2,000 analyses. The averages calculated from all the analyses for a large number of feeding

stuffs will be of practical use in connection with feeding experiments. Heretofore, in experiments made in this country regarding the relative value of feeding stuffs for the nutrition of farm animals, it has been necessary to rely upon compilations of European analyses or a very small number of American analyses.

The bulletin on the fermentations of milk, prepared by Prof. H. W. Conn, is a satisfactory résumé of the results obtained at home and abroad in the investigation of the bacteria and other ferments to which, as has been known for some time, the various changes in milk, butter, and cheese are largely due, and in regard to which definite information has only been obtained in recent years. In view of the wide interest attaching to this subject, a farmers' bulletin on the same topic has been prepared for general distribution.

At the meeting of the Association of American Agricultural Colleges and Experiment Stations, held in Washington August, 1891, a course of lectures on the investigations carried on at Rothamsted, England, was delivered by Robert Warington, F. R. S., who was generously sent to this country by Sir John Lawes to give our people information on the important and interesting work carried on there, and justly regarded as of very high value. The lectures have since been published as a bulletin of the Office of Experiment Stations. They deal for the most part with researches regarding the nitrogen of the soil and atmosphere and the ways in which it is made available to the plant.

Experiment stations are now in operation in all the States and Territories except Montana. During the year a new station has been established in Idaho. Considered as a whole, the work of the stations is proceeding with greater regularity and thoroughness than ever before. There is a gratifying tendency on the part of individual stations to confine their attention to the relatively few problems to which they can give adequate treatment. The demand for information of an immediately practical nature has of course influenced the stations thus far to devote a considerable share of their time to the preparation of compilations of information on many agricultural topics. This demand is a pleasant indication of the intellectual awakening of the farmers. At the same time it is important that the stations should not be too widely diverted from the various lines of original research claiming their attention. There is urgent necessity for experimental work in agriculture, and much time will undoubtedly be needed for the solution of many of the most important problems of agriculture which confront the farmer, and upon the satisfactory solution of which his future prosperity largely depends.

I feel compelled to call serious attention to the fact that in a few instances ignorance of the real purposes for which the stations were established has led to the dissipation of their resources in trivial enterprises, or to a vacillating policy in the management which has prevented the proper carrying through of many well-planned experiments. While

these cases are comparatively isolated, they raise the question whether it would not be best to give to this Department some supervisory discretion over the expenditure of the funds granted to the stations from the National Treasury.

While the work of the stations during the past year has been marked by progress along well-established lines rather than by striking discoveries of new principles, illustrations of important and useful results are not difficult to find.

In a number of States, especially those west of the Mississippi, much attention has been given to the culture of sugar beets. The stations, working in many cases in coöperation with this Department, have already done much to show whether there is a reasonable prospect of success in this industry in their several localities, and to teach the farmers the conditions for the profitable growth of this crop. In the South the stations are, by practical example, encouraging the introduction of new crops and agricultural industries. While they have by no means abandoned the effort to improve the treatment of the cotton crop, they are endeavoring to show that a more diversified agriculture would be far more profitable and satisfactory.

In dairying, the work of the past year has been highly satisfactory, presenting results of immense importance to the dairy interest.

Tests in the method of curing tobacco, chemical studies on California fruits, the feasibility of using the electric light for forcing certain plants, are among some of the most interesting experiments conducted by some of the stations.

DIVISION OF POMOLOGY.

The fruit crop has been below the average. Apples have been especially scarce, except in a few small sections. The same is true of the pear, plum, cherry, and peach crops. Grapes have been abundant, and the markets well supplied at a moderate cost. Berries have also borne quite well. Dried and canned fruits left over from last year's large yield will be needed to supplement the small amount secured this year.

The work of the division has been essentially the same as last year, as no increase has been made in the appropriation for its use. Notwithstanding the light crop in most of the more important fruit-growing districts, the general interest in fruit-growing continues active. Nearly as many specimens of fruit have been received from growers for examination and identification as in 1891, when the crop was large, while the number of growers in correspondence with the division has been larger than ever before. From the rapid increase in this part of the work it is probable that almost the entire time and attention of the force will need to be devoted to it during the summer and autumn months whenever there is a large crop throughout the most of the country.

The work on a catalogue of fruits is progressing, and within the com-

ing year it is expected to be able to publish that part pertaining to the apple, as much of the work has been done within the past year. This will be a check list which will give the latest approved name of each variety in accordance with lately established rules for simplifying the names of fruits and also the synonyms. This list will be of great use in helping to disentangle the confused state of pomological nomenclature and place within the hands of the fruit-growers a standard authority. In this connection it might be well to state that at a recent meeting of the American Horticultural Society at Chicago, Ill., a series of resolutions was adopted, in which it was urged upon the public that this division of the Department of Agriculture be recognized as the national authority on the identification and nomenclature of fruits and also as to the value of new varieties which are about to be offered to the public.

The importation of new fruits from foreign countries has been limited by the small fund available for that purpose. Some varieties of the kaki reputed to be hardy in the colder parts of Korea and Japan have been received and placed in the hands of propagators. Some choice Italian chestnuts from the slopes of Mount *Ætna* were secured early in the year and distributed among 150 experimenters for testing in various parts of the country. A few other small importations and distributions have been made. The collection and distribution of promising wild fruits, particularly of the plum and currant, have been continued through the instrumentality of voluntary collectors and experimenters in several States.

In response to numerous requests from national and State horticultural societies, meetings of a few such organizations have been attended by representatives of the division. It is believed that through this means much has been done to make plain to fruit-growers the advantages afforded them by the work of the division and the best means of availing themselves of it.

The monograph on wild grapes remains yet unpublished for lack of necessary funds.

DIVISION OF MICROSCOPY.

During the past year this division has been largely engaged in collecting specimens of the edible and poisonous mushrooms of the United States and Territories, which are intended for exhibition, collectively, at the World's Columbian Exposition. In this work the division has had the cordial assistance of the agricultural experiment stations of the country, and upwards of 600 molds have been made of individual specimens in this collection. The models will be colored from nature, and grouped and classed according to their edible or poisonous character. The groups, as a whole, will illustrate in miniature a forest scene, and indirectly will show some of the permanent causes of forest decay.

In consequence of the increased demand by the public for information relating to the cultivation of edible mushrooms, this subject has received continued attention, and new illustrations will be published from time to time showing the latest discoveries in this direction.

In the prosecution of experiments upon the oils, butter, and other fats, a new device connected with the microscope has been invented during the year, which promises to be of great value in the detection of adulterations of food fats and medicinal oils, such as have hitherto escaped detection.

New and important experiments have also been made in connection with silver nitrate as a test for adulterated food, medicinal or other oils, such as cotton-seed, olive, castor, linseed, etc., with well-defined results, which will be illustrated in the forth coming report, showing the relative reactions of the silver nitrate and the respective oils. Further experiments are also in progress relating to the testing of farmers' binding twine, pure and adulterated. Samples of cotton for microscopical examinations have been received from nearly every cotton-growing country in the world, as also a large assortment of animal fibers for examination and comparison.

FIBER INVESTIGATIONS.

The fiber investigations during the past year have been confined to flax culture, to the ramie interest, and to the semi-tropical leaf fibers, chiefly sisal, and bowstring hemp.

Early in the year the special agent in charge of the work spent some time in south Florida, where an experimental cleaning factory was temporarily established, and was successful in obtaining sufficient quantities of sisal hemp, and the fiber from the false sisal, bowstring hemp, pineapple, etc., for manufacture and test to show their commercial value. The plantations of sisal hemp from plants sent by the Department are growing finely, and there is considerable interest in the culture. Large plantings of *Sanseveria* or bowstring-hemp roots have also been made, and those interested in this new industry are sanguine of success. The plants grow readily, spreading rapidly, and can be cheaply harvested and cleaned, while the fiber is superior to sisal hemp, as it can be used in higher grades of manufacture.

There is the greatest interest in ramie, particularly since this industry has been fairly established in France. In October the Department tested three machines at New Orleans, and while the results of these tests showed that the machines presented were unsatisfactory, the official trials have stimulated invention, and improvements in American ramie machinery will inevitably follow. Save in the number of machines brought to test, the trials are fully as satisfactory as the French trials of 1889 in Paris, which marked the beginning of that advance in ramie machine construction abroad which has since brought about such

favorable results. It is the opinion of fiber experts and mechanical engineers in this country that such official trials are valuable as giving opportunity for making comparisons of principles of construction and for studying defects with a view to improvement.

From the fact that the manufacturing industry is now interesting capital largely in the United States, and that the question of a supply of the raw material will soon be a vital one, there is need for carefully and scientifically conducted experiments to show, once and for all, whether it will pay the Southern farmer to grow this crop. The fact that farmers are being urged by interested parties to go into ramie culture without this knowledge makes such experiment all the more important to save them from possible losses through attempting culture without knowledge of its requirements.

While progress in the flax industry has been slow, the interest continues, and several new inventions tending to materially reduce the cost of harvesting and preparation of the fiber are recorded. Among these is a machine to accomplish mechanically the laborious work of pulling flax by hand, the cost of which operation has been one of the chief arguments against flax culture in this country. Several new fiber-cleaning companies have established working plants, and the outlook is favorable for the production of fiber, though it must necessarily be confined to coarse uses at the outset. One of the results of the Department's recent flax-cultural experiments has been to show conclusively that, under proper conditions of cultivation, a fine quality of spinning fiber can be grown in many localities.

DIVISION OF GARDENS AND GROUNDS.

Besides the ornamentation and keeping of the grounds attached to the Department, this division is zealously engaged in the introduction, extension, and dissemination of utilizable plants, especially those of commercial importance. The operations of the division in this line of work have been recognized as attaining results of much value, particularly in regard to pomological interests.

It can not be made known too widely that this Department does not now, and never has, propagated for general distribution plants of merely ornamental repute. The want of recognition of this fact involves much unprofitable correspondence. Requests for collections of plants of the most varied character and of the most incongruous description are received. Many of these requests contain names of plants which could not be of any value to the applicant even if they could be supplied. Hence it is necessary that the prescribed operations of the garden should be kept in view, for it is neither useful nor expedient for the Department to propagate or distribute plants indiscriminately; but while the majority of these applications are not framed on a practical basis, they indicate praiseworthy efforts towards a greater diver-

sity in production, efforts which the Department is especially anxious to foster in every practicable direction.

Plantations of pineapples are constantly being extended in southeastern and in some other portions of Florida where the plants are not injured by winter colds. The demands from these districts for the best varieties are both numerous and pressing, and applicants are supplied as far as our present limits of propagation will permit.

About 66,000 plants have been distributed during the year. These were all what are termed economic plants, distinguished from those of merely ornamental value.

DIVISION OF RECORDS AND EDITING.

The steady growth of the work of this division, which includes the editorial work found to be necessary with reference to the bulletins prepared in the several divisions and a general supervision over the publishing interests of the Department, has fully confirmed the conviction which prompted its establishment by my direction nearly three years ago. The necessity for a most careful and judicious oversight of all features of the work relating to the publications of the Department becomes more and more apparent as the scope of the work enlarges and the consequent demands upon our appropriation for printing is increased.

The proper distribution of our publications has also received material promotion by this division through the synopses and publication lists which have been supplied regularly to the agricultural press. By this means the assistance which the Department is able through its printed information to render to the various agricultural interests of the country has been promptly brought to the notice of the class for which it is intended.

DOCUMENT AND FOLDING ROOM.

The provision of additional rooms for the use of the Document and Folding Room has facilitated in a marked degree the prompt mailing of publications, so that, notwithstanding the growth of this work, it has been accomplished without increase in the force assigned for its performance, although the continued growth of the publication work of the Department will soon make such an increase inevitable in order to efficiently carry on the work of distribution.

Exclusive of the monthly crop synopses, the issue of which aggregates nearly a million and a half yearly, and also of the publications of the Weather Bureau, over three-fourths of a million publications have been received and handled during the past year.

RAINFALL EXPERIMENTS.

Congress having again assigned a sum to be expended in experiments with a view to ascertain the possibility of producing rain by the use of explosives, it became my duty to continue these experiments on

the same lines as pursued last year. The work has been placed in the hands of the same gentleman who conducted the experiments last year and upon whose report Congress saw fit to extend an appropriation covering the present fiscal year. At present, of the facts relating to this subject now in my possession, I must say that they are not such as in my opinion justify the anticipations formed by the believers in this method of artificial rain-making. I have not included in my estimates for appropriations for the ensuing fiscal year any sum for this purpose.

WEATHER BUREAU.

I am happy to be able to say that, as the result of the work of the first year during which this Bureau has formed a part of this Department, our first care, the improvement of the forecasts and their extended distribution, has met with some measure of success. The yearly percentages of verifications for all stations east of the Rocky Mountains are: Twenty-four-hour forecasts, 83.7; wind signals, 76; cold-wave signals, 67.4; being respectively 0.2, 5.1, and 10.4 per cent higher than for the preceding year. A much larger number of forty-eight and seventy-two hour forecasts were made than during the preceding year, namely, 7,157 of the former, and 271 of the latter, by comparison with 2,189 of the former, and 114 of the latter in the year previous. The improvement in the character of the forecasts calls for special scientific research into the fundamental physical laws underlying meteorology, and into the relations between meteorology and general terrestrial phenomena. We must now have also in meteorology observations of the conditions prevailing in the upper air strata. The policy of the Bureau has looked, therefore, to the reëstablishment of high-level stations, and the station at Pike's Peak has been reopened. Nevertheless, all the requirements of modern meteorology can not be fully met by mountain stations. We need a certain number of observations made in free air, and for this purpose balloons seem to be the only means at present available. With a proper outfit, which need not necessarily be very expensive, doubtless much could be ascertained.

A radical departure from the established policy of the Bureau was undertaken in the way of local forecasts, official predictions having been restricted up to a comparatively recent date entirely to the officials at Washington. In the first appropriation for the Weather Bureau provision was made for twenty of these local forecast officials; six more were appropriated for by last Congress, and as the demands continue urgent for the assignment of such officials at other cities, the number will doubtless have to be increased. These local forecast officials, having the advantage of a personal knowledge of the topography and climatology of their districts, ought to be able to make more accurate predictions for their individual districts than has been possible for the officials of this office.

The total number of weather maps issued daily during the past fiscal year was 6,800, an increase of 3,700 over the year previous. The rule is to furnish these maps, which cost the Bureau less than half a cent apiece, to all who will display them for the information of the public. They are also furnished to many schools and colleges where instruction in meteorology is given. Many of the newspapers in large cities have also undertaken to print facsimile maps, reduced, thus reaching hundreds of thousands of persons at comparatively little expense to the Bureau. It was found desirable to issue an explanation of the weather charts, including with necessary brevity a general statement of the laws governing the motions of storms in the United States, for popular reading in connection with the map. This has been printed and freely distributed.

In the cotton region the Bureau has continued to render important information to cotton-growers. The time for taking and reporting the observations has been extended, and these are now made from April 16 to November 30 of each year. Requests for new stations have been received, but it has been found practicable to open only two.

The arrangement for receiving reports from the West Indies during the hurricane season, namely, from July 1 to October 15, has been maintained, although the daily telegraphic reports have been discontinued, except when an unusual meteorological condition prevails or information is received of an approaching storm, either at the time of the regular observation or during the interval between the two observations.

An arrangement has also been made with the governor of the Bahama Islands for daily reports by telegraph without expense to the Bureau, this office in return transmitting reports once a day to Nassau.

FLOOD PREDICTIONS.

We have now in active operation 166 special river stations and 59 special rainfall stations, arranged in groups or sections. The river observers record the rainfall also. River bulletins are issued at 22 places. On April 21 a special bulletin in relation to an expected flood along the Lower Mississippi was issued and found to be of great value; it was verified in all detail.

A special study has been made of the most destructive storms and of the losses occasioned thereby, as also of deaths caused by violent winds and lightning. Of 1,207 storms considered, 71 per cent were storms not especially dangerous either to life or property, while only 70 storms were destructive to the amount of \$10,000 or more. The death record shows the deaths by lightning to have been far more frequent during the past two years than deaths from wind storms. This condition was reversed during the year 1890.

The table showing the meteorological forms and reports received from all classes of observers presents an aggregate of 195,218, or 6,978 more

than in the previous year. In addition to the above, numerous special reports of severe local storms, tornadoes, etc., have been received.

The promptness and efficiency of regular and special observers deserve special commendation. It is a remarkable fact that out of nearly 200,000 reports there should be but 113 delinquents.

Requests for meteorological data have been as numerous as in former years, and as varied in character, and the Bureau has followed out the liberal policy of furnishing climatological information as outlined in previous reports. All recent applications have been met and satisfied. The total number of such requests received from the various States of the Union aggregate 504.

The State weather service work has been carried on to a much greater extent than heretofore, and the results accomplished prove the usefulness and importance of this branch of the Bureau. The entire territory of the United States, with the exception of Alaska, is now covered by local weather services. During the year Iowa, Maryland, New Jersey, and Ohio have provided for the maintenance of their respective State services, and it is possible their action will be followed in the present year by the legislatures of other States. The work in New England, which until March 22, 1892, was conducted under the direction of the New England Meteorological Society, with a central station at Cambridge, was on that date transferred to Boston and the name changed to the New England Weather Service. In California, in addition to the usual work of the service, weekly weather crop bulletins have been issued from Red Bluff, Fresno, and Los Angeles. The regular monthly reports now contain important tables, so that it is possible to obtain the special features of the climate of every section of the country.

THE DISTRIBUTION OF FORECASTS AND FROST AND COLD-WAVE WARNINGS.

This branch of the work of the division has greatly increased during the past year, but has been hampered by inadequate appropriations for telegraphic purposes. The increase in the number of stations supplied by telegraph at Government expense with the daily forecasts, as compared with the number supplied on June 30, 1891, is over 200 per cent, and on the 1st of July, 1892, our lists show a total number of 1,888 receiving a daily telegram at the expense of the Weather Bureau.

A large number of applications could not be favorably considered, as the allotment of the telegraph appropriation would not admit of any increase over the number already supplied. One hundred and thirty-six stations have been established under the auspices of the National Grange of the Patrons of Husbandry, many of which were supplied with flags by the Weather Bureau, while others disseminated the forecasts and warnings by means of steam whistles.

There appears to be no abatement in the interest manifested by all

classes and conditions in the forecasts and warnings, and hearty coöperation is met with by this office in its endeavors to place the information in the hands of all who would be benefited.

The railroad, telegraph, and train service, as gratuitous means of distribution, are largely utilized, and nearly three thousand places receive the forecasts daily in this manner, and over one thousand points are supplied by mail or a free telegraph or telephone service.

The total number of forecasts and cold-wave and frost warnings distributed was 6,368, of which 2,480 were distributed by telegraph or telephone at Government expense, the remainder without expense to the Government by telegraph and railroad services, and 639 of them by mail.

The wide and intelligent distribution of the forecasts is a feature of great importance in the work of the Bureau. The matter has received special attention during the past year, and I am warranted in saying that the success obtained has been limited only by the appropriation. This is an expenditure made directly for the benefit of the people. None of it goes in any way to the support of the Bureau or its employees, but is returned directly in giving warning of impending changes.

REPORTS.

Scientific reports for the use of the various scientific divisions of the Department were made as follows: For the Division of Ornithology and Mammalogy, a report on the temperature of a number of places in the United States, as illustrating the effect of climate on vital phenomena; for the Division of Pomology, a series of frost charts showing the average date of the last killing frost in the United States, and also the dates of last killing frosts in 1889, 1890, and 1891; and for the Division of Vegetable Pathology, a report of the temperature and rainfall of certain years in the peach-growing districts of Delaware and Maryland.

During the past four or five months something like 400,000 annual reports and extracts from the same, professional papers, and other publications, including weather maps, have been sent out by the publications section.

Four important bulletins have been published and widely distributed. The first consists of notes on the climate and meteorology of Death Valley, California, by the Chief of the Weather Bureau, and treats of (1) the physical features of the valley; (2) station and instruments; (3) discussion of observations; (4) the weather in the valley; (5) the automatic registers, and (6) the deductions, with tables of the daily pressure, temperature, relative humidity, wind directions and velocities, etc.

Bulletin No. 2 consists of notes on a new method for the discussion of magnetic observations, by Prof. Frank H. Bigelow. Bulletin No. 3 is a report on the relations of soil to climate, by Prof. E. W. Hilgard, of the University of California, and treats of the processes of soil for-

mation, first, through mechanical agencies, such as changes of temperature, freezing water, etc.; second, through chemical agencies; and third, by weathering or fallowing. Bulletin No. 4 is a report on some physical properties of soils in their relation to moisture and crop distribution, by Prof. Milton Whitney, of the Maryland Agricultural College. This report is based partly on the author's original work and partly on a generalization of the work of others in this line, as reported in the literature of the day.

WORLD'S COLUMBIAN EXPOSITION.

The general work of preparing a suitable exhibit illustrative of the functions and work of this Department has been continued under the charge of the Assistant Secretary, who has also filled the office of chairman of the World's Fair Government exhibit, which will embrace exhibits from all the departments of the Government. The preparation of the exhibits of this Department is in a forward state, and has necessarily occupied a considerable portion of the time and attention of the force in each division.

The extent and variety of the contributions from this Department are set forth in the summary presented by Assistant Secretary Willits to the committee of Congress having the matter in charge.

From the Museum: Specially prepared displays of selected cereals, tobacco, and animal and vegetable fibers (now in process of collection and arrangement), illustrating distribution, the effects of transplantation, of changes of soil, climate, and altitude, and illustrative as well of departmental methods of study and treatment.

From the Bureau of Animal Industry: Illustrations of the parasites of animals; of the work of quarantine stations; of the processes of meat inspection; of transportation of live animals and meat; tagging; the handling of live stock; horseshoeing, and the diseases incident to defective shoeing; the work of the Department in connection with animal diseases, and disease germs from the bacteriological laboratory.

From the Weather Bureau: A complete set of meteorological instruments in operation. The entire work of forecasting, from the receipt of telegrams to the publication and distribution of weather maps, will be carried on upon the ground, in the presence of any one who may care to study the methods of the Bureau, and the various processes will be explained, with a view to the popularization of meteorological knowledge.

From the Division of Entomology: Collections and models of insects injurious and beneficial to agriculture, enlarged illustrations of their operations, and implements and materials of suppression and culture.

From the Division of Ornithology and Mammalogy: A large model of the Death Valley region, where altitudes varying from several hundred feet below to 15,000 feet above sea level are in such close proximity as to disclose at a glance all the life zones of the country, animal specimens and groups characteristic of these life zones, birds and mammals beneficial or harmful to the farmer.

From the Botanical and Horticultural Divisions: Collections, growing and preserved, of medicinal, forage, and other economic plants, with cases illustrating herbarium methods of work and treatment.

From the Division of Forestry: A classified collection of sections of forest trees of

the United States, with demonstrations of their economic uses; apparatus (in operation) for testing the strength and other qualities of timber; illustrations of methods shown by experience to be best adapted to forest culture; metal railway ties advocated as a substitute for timber, and whose adoption would serve powerfully to protect our remaining forests from destruction.

From the Division of Chemistry: A complete agricultural laboratory, in which demonstrations of food adulteration, the saccharine value of sugar plants, and analyses of soils will be carried on; samples of adulterated foods which have been tested by the Department.

From the Division of Statistics: Charts and maps illustrating the values of agricultural products, the range of prices, and the distribution of staple products; blanks and materials illustrative of the statistical methods of the Department.

From the Division of Microscopy: A collection of models of fungi, edible and poisonous; models of fungi which attack forest and other trees; articles, instruments, methods, and results of investigations of adulterations of butter and other commercial fat.

From the Division of Vegetable Pathology: Models and drawings illustrative of fungous diseases of fruits and fruit trees; remedial agents, implements, and methods of protection, cure, and eradication.

From the Division of Pomology: Models of American fruits, illustrating differentiation due to transplantation; classified exhibit of edible nuts; illustrations of methods of planting and cultivating small fruits.

From the Office of Experiment Stations: Illustrations of its methods of editorial work, and of summarizing the reports of stations.

From the Division of Records and Editing: A complete set of the publications of Department arranged for consultation, and a "bureau of information."

From the Division of Illustrations: The original plates and figures used in the reports and bulletins of the Department, illustrating the care and skill demanded in the preparation of these publications.

From the Office of Irrigation Inquiry: A model of an ideal valley, with canals and sluices, illustrating modern irrigation methods; a map of the arid region, showing location of artesian wells and irrigation works.

BUILDINGS

It seems necessary that I should again call to your attention the urgent necessity for a suitable provision by Congress for additional buildings for the accommodation of this Department and its work. When I assumed control of it, as I stated in my first report, I found the present buildings overcrowded, the work hampered by the inconvenience and unsuitable arrangements which we were compelled to make for want of proper accommodation, including occasionally the assignment of the force of a single division to separate buildings. All these conditions continue to exist, and the difficulties inherent thereto are enhanced by the great increase in the work of the Department, which now numbers eighteen principal divisions, as compared with twelve when I assumed control, inclusive of the Weather Bureau. They are difficulties, moreover, which it is not in the power of the head of this Department to remedy until additional building accommodation is provided.

It has been found imperatively necessary during the present administration for this Department to lease buildings outside of its grounds,

and at an inconvenient distance from the main building, for the Division of Chemistry and its important laboratory work, and for the laboratory facilities necessary to carry on the experimental work of the Bureau of Animal Industry. Moreover, as I have already had occasion to impress upon the committee of Congress representing this Department, our present buildings are not fireproof, and the immense amount of valuable material accumulated in them is constantly exposed to serious loss on this account. Some plan for a building which shall ultimately accommodate in a suitable manner the entire Department in all branches of its work should be devised, and this plan should be of such a nature that construction could be undertaken and completed in sections, thus accommodating within a short period certain divisions which are at present the most embarrassed, owing to the difficulties I have mentioned. By this means, moreover, the cost of the building would be distributed throughout several years, with the result of having at the end of that time a building which will compare favorably with any of the buildings provided for our public departments at the Capital, and which will be equipped in every respect, as it should be, for the carrying on of the Department work.

As regards the accumulation of valuable property I need only instance a single case. I refer to the herbarium, which includes the largest collection of American grasses in existence, and contains type specimens of nearly all the species of American grasses described during the last fifteen years. Were such property as this to be destroyed the loss would be in some respects irreparable, while it would take many years and a very large sum of money to even partially replace it. In regard to the enlargement of the museum, which it is hardly necessary to say should be the most complete strictly agricultural museum in the world, the principal difficulty lies in the want of a suitable building and necessary accommodation. Our present lack in this respect practically renders any further reference to this very important feature of the Department unnecessary.

FUTURE ORGANIZATION.

Before closing this report it seems to me important that, as the result of nearly four years' experience in conducting the work of this Department, I should indicate, as definitely as possible, some of the plans for its future administration which seem to me eminently desirable in order to maintain and promote its efficiency. Before proceeding to state these plans in detail I desire once more to emphasize the fact that, in all plans designed for the future conduct of this Department, the future growth and development of this country and of its agricultural resources, its population, and its standing among the nations of the world must be duly appreciated and considered. The possibilities of the present may do for the consideration of private enterprise seek-

ing immediate return on capital invested, but in the affairs of the nation true prescience is an essential attribute to the wise administrator. I must not, therefore, be deemed extravagant if I present designs for the future development of the Department which I conceive to be necessary to meet the demands not only of the near future but those of a score of years hence.

One of the first difficulties confronting the head of this Department under its present organization is the fact that the number of responsible heads of the several branches of the work who are in direct consultation with the Secretary or his Assistant is too great; and desiring to adhere as closely as possible to the methods which have been found satisfactory in the administration of the other great Departments of the Government, I should advise the application of the bureau system which obtains in most of them to the wants of this Department. The grouping of the several branches of the work into various bureaus, each one having for its chief the right kind of man, would most sensibly facilitate the administration of the work, reducing the number of persons in direct consultation with the head of the Department from 18 to 20 down to about one-third of that number, and placing the chief of each division, as at present organized, under a chief whom he would find readily accessible, and who, on his part, would secure thorough and systematic coöperation between the several divisions grouped together under his control.

Another advantage of this system is that it would provide in the Department several offices of sufficient emolument and dignity to attract men of the highest standing in the several departments of the work which it maintains, men thoroughly qualified to lead in their several specialties, and to command the respect and appreciation of all workers on the same lines not only in this but in foreign countries. Under our present system it is extremely difficult to retain in the departmental service men combining the highest attainments with administrative capacity. The following groups, as the basis of bureau organization, suggest themselves to my mind, without, however, suggesting names at present other than those necessary to indicate the general character of each group:

First, plant culture, which should embrace the present Divisions of Horticulture, Vegetable Pathology, Pomology, Gardens and Grounds, and the Seed Division.

Second, biological, to embrace the Divisions of Botany, Ornithology, and Mammalogy, and Entomology.

Third, statistical, the present division to be made a bureau of agricultural statistics, and to cover, in addition to its present work, the entire field of economic agriculture, the extension of markets abroad, and to embrace, say, three divisions, one of crop conditions and statistics, one of agricultural economics, and one of foreign markets and crops.

Fourth, educational. This should control the relations of the Depart-

ment with the various channels of agricultural education, such as agricultural societies, granges, farmers' institutes, etc., and should include the present Office of Experiment Stations, the Division of Records and Editing, the Division of Illustrations, the Library and Museum, and the Folding and Document Room. There should also for the present be included in this group a division of agricultural engineering, covering the subjects of drainage, irrigation, public roads, farm buildings, etc.

The Bureau of Animal Industry is already organized, and constitutes a well-defined group as it stands, including divisions of inspection, field investigation and miscellaneous work, animal pathology, and quarantine.

The Weather Bureau would also stand without essential modification. There remain, then, not included in any groups enumerated, two highly important divisions, one of which, however, Forestry, will, I believe, ere long, if properly fostered and administered, develop into a bureau embracing at least two divisions, one of scientific investigation and study, the other of an administrative character and closely akin in its general administrative features to the present organization of the Bureau of Animal Industry.

To include the Division of Chemistry in any of the groups enumerated would be impossible, owing to the relations which it must necessarily hold to the general scientific chemical work of the Department, since the chief, with his principal assistants, must be at all times available as scientific chemical advisers in any branch of the work requiring the highest chemical ability and laboratory service.

UNIVERSAL MEAT INSPECTION.

Having thus endeavored to sketch a plan whereby the machinery of this Department would, in my opinion, run more smoothly, and facilitate the execution of the responsible duties imposed upon it, I will now suggest three or four features, which it is imperative should be undertaken at the earliest date possible under the auspices of the Department of Agriculture. What has been already said in this report in regard to the effects of cattle and meat inspection and the excellent results indicated in restoring the confidence of the trade in our animals and meats, a confidence which had been shaken, and in some cases destroyed by exaggerated and false reports of disease circulated by our competitors and by alarmists in this country, has impressed me with the conviction of the absolute necessity of providing for a meat inspection in the near future, which shall extend to every pound of meat consumed as food by the people of the United States. By what means this may be effected it is not for me to dictate, but I conceive it to be a duty which I must not shirk, to make public the results of the experience which the work already done under my direction in this respect has afforded me, and I unhesitatingly assert, as a prime necessity for the accomplishment of two great objects, the need of such a

universal inspection, covering all animals slaughtered for human food. These two great objects are, first, to secure to American consumers who are large meat-eaters, and who ought to have the very best kind of food, the most healthful meats, free from all possible taint of disease. Science is revealing every day more intimate relations between the diseases of animals and the diseases of the human race, and the insidious means by which these are communicated from one to the other. Against the possibility of such results we must protect our people. As a result of the meat inspection already executed under the direction of this Department, we have raised the standard of taste in this matter among consumers themselves: witness the increased price willingly paid, not only in our own markets but abroad, for meat bearing our certificate of inspection. The second object to be thus accomplished, is that which has been already in a very satisfactory degree attained, but which must be sedulously maintained—the reputation of our meat products abroad.

PURE MILK.

Closely akin to this subject of cattle and meat inspection comes that of the dairy, and of milk consumed throughout the country, for which a system of inspection is quite as urgently needed. It is impossible to exaggerate the importance of securing pure milk from the most healthful sources, or the dangers to which the human race is exposed from consuming milk from those which are diseased or tainted. It is needless to dwell here upon the extent to which milk enters into human consumption.

Having called attention to the great danger attending the consumption of animal products without some guaranty as to healthfulness, and having demonstrated, so far, at least, as cattle and meats are concerned, the feasibility of an inspection which shall secure such a guaranty, I will not undertake to discuss the means by which these desirable objects can be obtained. All details must be left to the wisdom of Congress, to which body I respectfully commend them.

The object to be kept in view, and one which ought to be dear to every American citizen, is that, in so far as all American products are concerned which enter into food consumption, the word "American" shall be recognized the world over as synonymous with healthfulness and honesty, and that, wherever it is seen, the certificate of this Department shall stand for a brand of excellence.

NATIONAL STANDARD OF GRAIN.

Another matter which is the subject of legislation now pending is that of a national standard of grain. There is evidence in the correspondence of this Department of a steadily growing feeling in favor of the establishment of such a national standard, which will relieve the grower from the annoyance inseparable from the existence of several

standards, varying in the different grain markets of the country. Unquestionably, some system of national inspection and grading under the control of the Secretary of Agriculture should be established in the interest of the grain-growers, and would be, without doubt, in a very short time accepted and recognized in all the great market centers of the United States.

FOUNDATION FOR THE FUTURE.

The work of the Department hitherto has been but foundation work, as I may say. Moreover, until the Department was given its present status in the National Government it was impossible that even foundation work should be undertaken and carried on with any great degree of success, from the fact that the ultimate plan of the superstructure to be erected upon it had never been fully depicted nor carefully laid out. During my administration as Secretary my endeavor has been to gather together all that was available for the future work of the Department, to reorganize, rearrange, fit, and combine the several branches of the work, adding thereto all that seemed necessary to lay a broad and lasting foundation for the ultimate carrying out of plans which I have kept constantly in my mind in performing the work assigned to me. If in the future my humble share of credit in the history of the Department should be that I had been instrumental in securely laying a broad and lasting foundation for a magnificent superstructure of which every American farmer, and, I may say, every American citizen, will feel proud, I shall be more than compensated for my labors during the past few years.

The motto of this Department must be "ever onward." It has, in my opinion, succeeded during the few years since it has been an Executive Department of the Government in impressing upon the 10,000,000 of industrious citizens who represent the workers in the field of agriculture in the United States its capacity to advance their interests, and with the growth of this confidence on the part of the American farmers, we must not forget there is a corresponding growth in the responsibilities of the head of this Department. The National Government has taken, as it were, a contract with the farmers, and to carry it out efficiently this Department must be prepared to answer all reasonable expectations in bringing into the service of agriculture all that science, whether in this country or in any other country upon the globe, has been able to evolve for its benefit. The history of science is a history of continual discovery, and all discoveries in the solution of agricultural problems calculated to lighten the burdens of the farmer and increase his profits must be made the property of the Department through the energy and intelligence of its head and its responsible officers, and be thus made available through them to the farmers of the United States. I have already shown the important part which agri-

culture plays in the commercial interests of the country, and in this respect also the Department must prove itself a capable source of information, an intrepid leader into new fields, and a worthy representative of the interest upon which all other interests, and thus the entire prosperity of our country, depends.

In the earnest hope that the wisdom of succeeding administrations may find the men and the means to carry on the work of this Department to the high destiny which I conceive it to be designed to attain, I have the honor, Mr. President, to submit this, my last report, and I desire, as my last word, to express to you my profound appreciation of the cordial sympathy and broad intelligence with which you have uniformly, throughout your administration, heeded the needs of the agricultural interests of this country. While no one has been so situated as to understand and appreciate this better than myself, I confidently believe that the people, and especially the farming people of this country, will learn to appreciate more and more the fact that the first administration during which their representative department held the rank of an Executive Department of the Government was presided over by a Chief Executive who never failed to appreciate the importance of agriculture, its dignity, and its value to the country at large.

Very respectfully, your obedient servant,

J. M. RUSK,
Secretary.



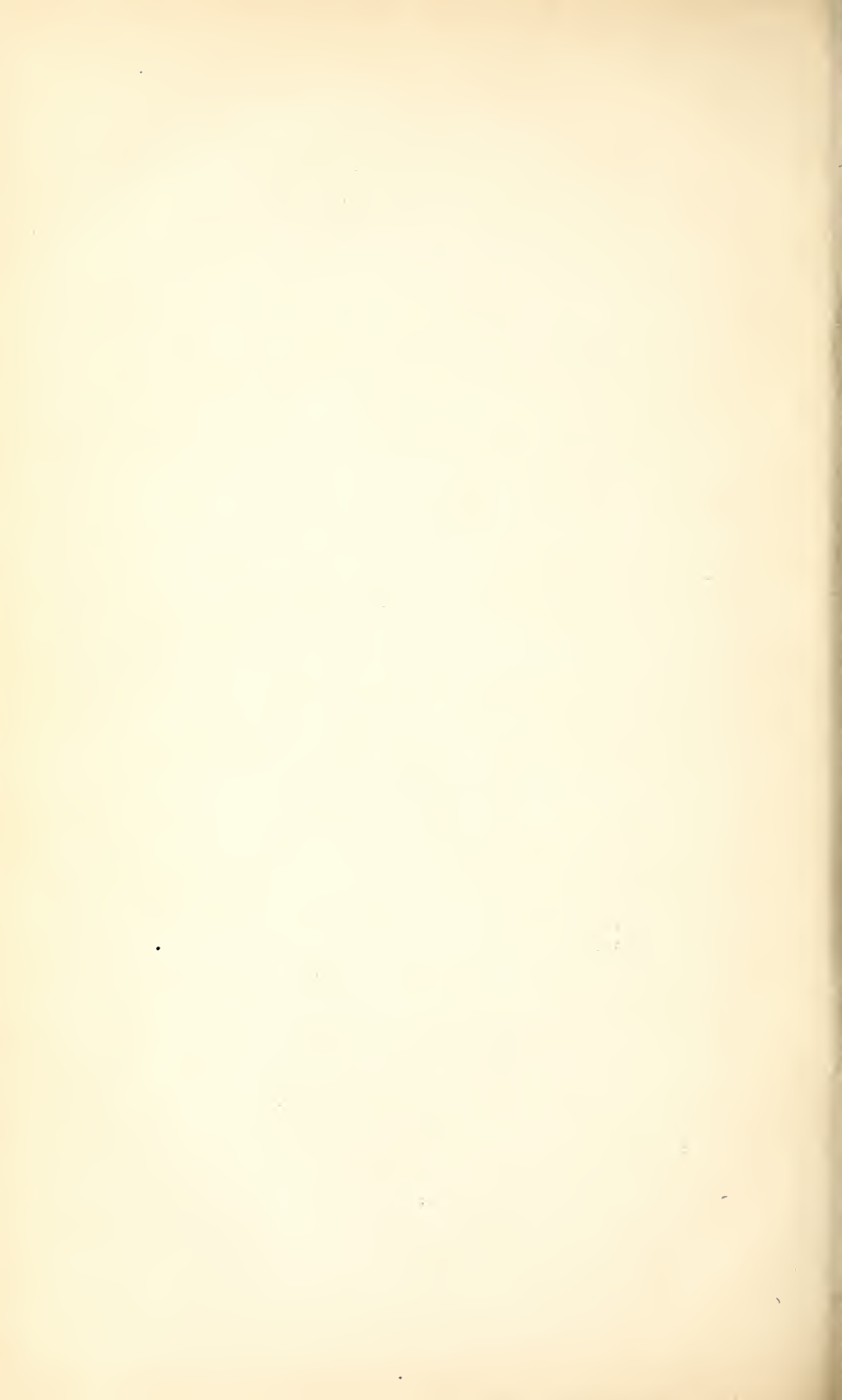
SELECTED CORRESPONDENCE

RELATING TO THE

EXPORT TRADE OF THE UNITED STATES

IN

LIVE STOCK AND MEAT PRODUCTS.



CORRESPONDENCE RELATING TO EXPORT TRADE IN LIVE STOCK.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., February 18, 1890.

SIR: I have the honor to invite your attention to certain regulations and prohibitory restrictions which are enforced by a number of European governments, to the great detriment and in some cases to the destruction of the trade in live animals and meat products from the United States, and to request that you take such action as may be possible looking to a removal of such restrictions, or their modification in favor of American producers.

In 1879 the British Government made regulations that all cattle, sheep, and swine from this country should be slaughtered at the wharves within ten days from time of landing. The effect of this order is to entirely exclude store cattle and sheep shipped for fattening purposes; and it considerably reduces the amount which can be realized for fat animals, because these can not be held until they have recovered from the effects of the voyage, and also because the buyers know that they must be disposed of within a limited time.

The order in regard to cattle was issued on account of the existence of the contagious pleuro-pneumonia of cattle in this country, but since its issuance this disease has been almost entirely eradicated. It no longer exists in any section from which export steers are obtained, and it is confined to two counties on Long Island and one in New Jersey, all of which are in strict quarantine. The stock yards which might have been contaminated have been thoroughly disinfected and there is no longer danger of exporting the contagion of this disease.

During the year 1889 a number of cases of pleuro-pneumonia were reported by the English inspectors among cattle landed from the United States, but this Department regards such reports as based upon errors of diagnosis for the reasons given above. This conclusion is considered the more evident because the returns which have been received show that in the greater number of cases but a single animal was found affected in any one cargo, which would be unlikely with a contagious disease. It is also admitted by most veterinarians that there are seldom any typical characters found in contagious pleuro-pneumonia which enable the inspectors to distinguish it from the sporadic or noncontagious inflammation involving the same organs. In all such cases the diagnosis must be based upon a history of contagion or upon the discovery of a number of animals in the same lot which are similarly affected—a fact which indicates contagion. In the cases reported by the English inspectors during 1889 there has neither been a history of contagion nor a sufficient proportion found affected to indicate a contagious disease. It would, therefore, seem highly probable that the disease observed in these steers was the result of injuries or exposure incident to the voyage.

As a preliminary measure for securing information in regard to the character of the disease found in American cattle slaughtered in England, I would suggest that the Department of State make arrangements with the English Government by which one or more of the veterinary inspectors of this Department can be stationed at the English "foreign-animals wharves." These inspectors would observe any affected animals which might be discovered, and by promptly notifying this Department it would be possible to trace the history of such animals and determine definitely if they had ever been exposed to a contagious disease.

The thorough control which is now maintained over the small areas affected with pleuro-pneumonia in this country, and the near approach of the time when this disease will be entirely eradicated, make it desirable that negotiations should be begun looking to the withdrawal of British restrictions. The time is opportune for this, since the Scotch and English farmers are agitating to secure the same result, so that they can obtain cattle for feeding from the United States. Their present supply comes mostly from Ireland, where prices are much higher than here and where the danger from pleuro-pneumonia is incomparably greater.

The restrictions on the importation of sheep into Great Britain were based upon the alleged importation of foot-and-mouth disease from this country. As this disease has never existed in the United States, except in two or three instances when cattle landed from England were found affected with it, and as it has never been allowed to spread here, it is evident that the sheep in question must have contracted the disease on vessels that had previously been infected by English cattle. The restrictions are, consequently, a great injustice and should have been removed long ago. Their effect upon the trade is seen by reference to the statistics of the English agricultural department, which show that in 1879 the number of sheep imported from the United States was 119,350, and that it rapidly decreased until in 1888 it was but 1,203, though in 1889 it increased, according to the statistics of the United States Treasury Department, to 18,877.

The German regulations in regard to American cattle, as communicated in your favor of December 3, 1889, prevent the development of a profitable trade with that country. The single shipment made there last year yielded good returns, but the statement that was immediately telegraphed here to the effect that further imports of American cattle had been prohibited at once arrested all efforts in that direction. While any quarantine of our cattle is an unjust requirement, a four weeks' retention would seem to be entirely unnecessary with cattle designed for immediate slaughter. Probably if this matter were brought to the attention of the German Government more favorable regulations could be obtained. At all events, the State Department could be of service to the cattle industry of this country by obtaining exact information as to the regulations which would be enforced against cattle landed for slaughter. There appears to be at present considerable uncertainty as to whether such animals are entirely prohibited, or whether they may be landed and go to any part of the Empire after four weeks of quarantine, or whether such quarantine must necessarily be enforced with animals that might be at once slaughtered at the port of landing.

There have also been press telegrams from Germany which stated that American dressed beef and canned meats either had been or were about to be excluded. I would suggest that you obtain reliable information in regard to this matter and take such steps as you may consider proper to protect the interests of our exporters.

The prohibition of American pork by both Germany and France is still continued, notwithstanding the demonstrated healthfulness of this article of food. This regulation was made with a view of preventing trichinosis among consumers, but it has been shown that no case of this disease was ever produced in either country by American meats; indeed the curing process through which all exported meats must pass is a sufficient safeguard against this disease.

The surplus of meat-producing animals in the United States at present is such that prices are below the cost of production, and consequently it is extremely important that we should increase our exports of live animals and meat products, if this can possibly be accomplished.

Any further information on this subject in the possession of this Department which you may desire will be promptly supplied.

Very respectfully,

J. M. RUSK,
Secretary.

THE SECRETARY OF STATE.

DEPARTMENT OF STATE, *Washington, March 4, 1890.*

SIR: I have the honor to acknowledge the receipt of your letter of the 18th ultimo, concerning the prohibitory regulations and restrictions of the governments of France, Germany, and Great Britain, in the matter of American live animals and hog products.

A copy of your letter has been communicated to the ministers of the United States at Berlin, London, and Paris, to the end that they make all possible representations upon the subject to the governments to which they are respectively accredited, in the hope of obtaining a revocation of the unnecessary measures or their material modification in the interest of an important industry of the United States.

Upon receipt of the replies in each case, I shall duly apprise you thereof.

I have the honor to be, sir, your obedient servant,

JAMES G. BLAINE.

The SECRETARY OF AGRICULTURE.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., April 24, 1890.

SIR: Referring to your letter of the 19th instant, transmitting the dispatch of Mr. Lincoln concerning the restrictions imposed on the importation of American live stock into Great Britain, I have the honor to state that at present there are no laws by which the requirements of the British Government can be complied with as regards the importation of sheep into the United States. There is a bill now before Congress which, if passed, will give the Secretary of Agriculture authority to make the necessary regulations.

As to the number of inspectors that will be required to represent this Department, it appears that a chief inspector at London, with one subordinate at Liverpool and another at Glasgow, will be sufficient, and I would, therefore, request that three inspectors be indicated as the number probably necessary to properly inspect the live stock arriving there from this country.

Concerning the continued discovery of disease among our cattle, which is considered by the English veterinarians to be contagious pleuro-pneumonia, it may be said that such cases have recently been reported among cattle from Baltimore, and yet there has not been a case of this disease discovered in Maryland in nearly a year. During this period a quarantine has been maintained, all animals that died of disease have been examined, and all slaughtered at Baltimore have been inspected. So confident am I that the plague has been eradicated that the quarantine now in force there will be removed on the 1st of May next. The information now furnished this Department by its inspectors indicates most positively that the contagion of pleuro-pneumonia has been eradicated from this country with the exception of a small area on Long Island which is in strict quarantine and where affected herds are slaughtered as soon as discovered. It is, therefore, inexplicable that cattle should be shipped from Baltimore affected with this disease.

These facts should, I think, be plainly presented to the British Government, for even if they are unwilling to accept them as conclusive at present, it will prepare the way for a demonstration of our position when our inspectors are established at the ports of debarkation, and when each case can be critically examined.

Very respectfully,

J. M. RUSK,
Secretary.

The SECRETARY OF STATE.

DEPARTMENT OF STATE, *Washington, June 24, 1890.*

SIR: Referring to your letter of the 24th of April last to this Department, relative to the inspection of American cattle in Great Britain, I have the honor to inform you that a telegram has been received from our minister at London stating that veterinary inspectors are permitted to act there. Inclosing a copy of the telegram for your information,

I have the honor to be, sir, your obedient servant,

JAMES G. BLAINE.

The SECRETARY OF AGRICULTURE.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., July 23, 1890.

SIR: Referring to your favor of the 2d instant, inclosing a copy of a dispatch from Minister Lincoln, at London, announcing the permission granted by the British Government for the stationing of three veterinary inspectors at the foreign animals wharves in Great Britain, for the purpose of inspecting American cattle as they are landed, I have to inform you that I have appointed Dr. William H. Wray as chief veterinary inspector, to be stationed at London, and Drs. A. D. Melvin and J. F. Ryder as subordinate veterinary inspectors, to be stationed at Liverpool and Glasgow, respectively.

These gentlemen leave the United States on the 26th instant, accompanied by Dr. D. E. Salmon, chief of the Bureau of Animal Industry, in charge, who will make such arrangements as are necessary for the proper inauguration of the work of inspecting American cattle. This party has been directed to report to Minister Lincoln, at London.

I have the honor to ask that Minister Lincoln be notified of the appointment of these gentlemen and of the date of their departure from this country, and requested to attend to their proper introduction to the British authorities, and to confer with Dr. Salmon as to all the details necessary for accomplishing the work they have been appointed to perform. * * *

I have the honor to remain, sir, your most obedient servant,

J. M. RUSK,
Secretary.

The SECRETARY OF STATE.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., March 7, 1891.

SIR: I have the honor to call your attention to an act of Congress approved March 2, 1891, entitled "An act to provide for the safe transport and humane treatment or export cattle from the United States to foreign countries, and for other purposes," and to request that copies of the same be sent to the representatives of the United States in foreign countries, directing them to inform the governments to which they are respectively accredited of this legislation.

I would ask that the attention of our minister to Great Britain be called to the proposed legislation by that Government prohibiting the importation into that country of all cattle from west of the twelfth meridian of longitude, upon the ground of cruelty to cattle in course of transatlantic transportation, and also to the report of the Government commission created by Parliament last winter to inquire into the

subject of the ill-treatment of animals crossing the Atlantic. The recommendations of this commission are such that, if enforced, they will seriously embarrass, if not entirely cripple, the export trade of this country in live cattle with Great Britain.

I would request, therefore, that our minister at London be directed to inform the British Government that, as this Government has undertaken the work of regulating this trade and assumed the responsibility of securing proper treatment and accommodations for animals exported from its ports, legislation on the part of Great Britain as affecting export cattle from the United States is no longer necessary.

I have the honor to be, sir, your obedient servant,

J. M. RUSK,
Secretary.

THE SECRETARY OF STATE.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., April 13, 1891.

SIR: I have the honor to acknowledge the receipt of your favor of the 11th instant, containing a copy of a cablegram from our minister at London requesting to be informed of the essence of the regulations to be adopted for the safe transport and humane treatment of cattle exported from the United States to foreign countries.

In reply I would suggest that the following message, or so much thereof as you may deem advisable, be cabled to Minister Lincoln:

Secretary Rusk's regulations will provide—

(1) Inspection of vessel, to determine its adaptability to the cattle-carrying trade, and fixing the number of cattle which it will be allowed to carry, and granting a certificate for said vessel for one year, subject to compliance with all regulations.

(2) Space for cattle to be not less than 2 feet 8 inches by 8 feet for each animal.

(3) Permanent or temporary fittings of strong and substantial character, which will be described in detail.

(4) Ventilation, which will be regulated by a proper number of ventilators and hatches according to space occupied by cattle, and when necessary steam fans will be required.

(5) Quantity of food to be loaded will be regulated, also amount of fresh water in casks and capacity of condensers for supply of water.

(6) Number of attendants for a shipment of cattle will be designated, and such other requirements as may be necessary to secure the safe arrival in good condition of cattle shipped.

The Department thinks no legislation by Great Britain is necessary, inasmuch as the matter has been taken in hand by this Government and the loading will be under our supervision. We can agree to nothing which would tend to force some lines of ships out of the business and give a monopoly of the cattle-carrying trade to certain other lines. Dr. W. H. Wray, the chief inspector of this Department in London, could give Mr. Lincoln much information in regard to these points.

I have the honor to be, sir, your most obedient servant,

J. M. RUSK,
Secretary.

THE SECRETARY OF STATE.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., May 14, 1891.

SIR: I have the honor to inclose herewith a copy of a letter from Dr. D. E. Salmon, chief of the Bureau of Animal Industry of this Department, to Dr. W. H. Wray, American veterinary inspector at the port of Deptford, London, England, in relation to the two alleged cases of contagious pleuro-pneumonia, said to have been found by the British veterinary authorities among American cattle landed at Deptford from Baltimore, Md., ex steamship *Parkmore*, on April 7.

Accompanying Dr. Salmon's letter are two reports made by Dr. George C. Faville, veterinary inspector at the port of Baltimore, Md., giving the history of the two animals, respectively, as traced by him.

I would request that Dr. Salmon's letter, together with Dr. Faville's reports, be forwarded to our minister at London with instructions to call the attention of the British Government to the facts as found by this Department, and that proper steps be taken with a view of inducing the British veterinary authorities to withdraw their conclusion that the two animals referred to were affected with contagious pleuro-pneumonia.

Should our minister be unable to secure such a modification of their report, I would ask that he be directed to file a firm but respectful protest against the conclusion of the British veterinary authorities as not being in accordance with the facts.

I have the honor to be, sir, your most obedient servant,

J. M. RUSK,
Secretary.

The SECRETARY OF STATE.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF ANIMAL INDUSTRY,
Washington, D. C., May 11, 1891.

SIR: Upon receipt of your cablegram of the 18th ultimo, requesting the tracing of the animal bearing tag No. 77341, and your subsequent cablegram requesting the tracing of animal bearing tag No. 76888, I immediately directed Dr. George C. Faville, our inspector at the port of Baltimore, Md., at which port said animals were tagged and shipped per steamship *Parkmore*, on March 21, for Deptford, London, to trace said animals.

I inclose herewith for your information Dr. Faville's report of April 24, showing the tracing of animal bearing tag No. 77341, and his report of May 9 of the tracing of animal bearing tag No. 76888. It appears from the first report that animal bearing tag No. 77341 was shipped by Messrs. Myers & Hauseman, of Baltimore, and was one of the 64 head purchased by them on March 16 at Pittsburg stock yards, Pennsylvania. These animals all came from Circleville and Chillicothe, Ohio, and Dr. Faville gives the names of the owners of the farms from which they came, and which he visited. He found, on personal examination, that the premises are in excellent condition; that the herds at present thereon are in fine, healthy condition, and that at no time has there been any contagious disease of cattle known to exist in that part of the United States.

Steer bearing tag No. 76888 was shipped by Messrs. Myers & Hauseman per steamship *Parkmore*, and was tagged at Baltimore on March 20, 1891, being one of a lot of 29 animals, 27 of which came from Frederick County, Md., one from Warrenton, Va., and one from Summit Point, W. Va. As shown by Dr. Faville's report, he examined all the premises from which these animals came and found the same to be free from disease, and there never has been any history of any contagious disease among the cattle thereof.

It appears, therefore, from the tracing of these two animals, that their history shows an absence of any source of infection from which they could have taken the contagious disease known as pleuro-pneumonia, and that the parts of the country from which they came never had an outbreak of this disease.

The conclusion is consequently inevitable that the two steers, the tag numbers of which you cabled, and which arrived at Deptford, London, on the steamship *Parkmore*, could not have been affected with contagious pleuro-pneumonia.

I have also to acknowledge the receipt of your letter of the 28th ultimo, giving details in regard to the diagnosis by the British authorities of pleuro-pneumonia in these two steers, and your conclusion that the same were cases of interstitial pneumo-

nia and pleurisy; also the further fact that Dr. Ryder, stationed at Glasgow, and Dr. Melvin, at Liverpool, had examined these lungs in consultation with you, and that they agreed with your diagnosis. I note the further statement that Dr. J. E. Ryder, of the American Veterinary College of New York, now in London, had likewise consulted with you and that he decided that it was interstitial pneumonia and not contagious; also the further fact that Prof. W. Williams, of the Veterinary College at Edinburgh, Scotland, and his son, who is professor of cattle pathology and obstetrics at the same college, had examined these lungs under the microscope, and that their decision was corroborative of your own and that of Drs. Melvin and Ryder.

In view, therefore, of this corroborative evidence, as well as of the history of the two animals on this side of the water, and the physical impossibility of their having contracted the disease here, I am forced to agree with you in your diagnosis and confirm the same.

I have to request that you will lay before the British veterinary authorities the history of the tracing of these two animals on this side of the water, and I am satisfied that, when they learn of the absolute freedom from disease at all times of the premises and herds and parts of the country from which these animals were shipped, as appears from the thorough investigation just made, they will be willing to withdraw their conclusion that these animals were affected with contagious pleuropneumonia.

Very respectfully,

Dr. W. H. WRAY,
Deptford, London.

D. E. SALMON,
Chief of Bureau.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., June 27, 1891.

SIR: I have the honor to acknowledge the receipt of yours of the 19th instant, inclosing a communication from the British minister, together with the official notice by the government of the Dominion of Canada of the establishment of a quarantine period of fifteen days' duration on all sheep and swine imported into Canada from foreign countries.

In view of this action by the Dominion of Canada, and the consequent removal of the cause which made necessary my order of quarantine of May 19, 1891, on all sheep and swine imported into the United States from Canada, I have removed the quarantine established by this order, and directed that all sheep and swine imported into the United States from Canada shall be admitted without quarantine, provided the same are free of disease on inspection at time of entry.

I have the honor to inclose for your information, and for communication to the British minister at Washington, a copy of the order removing said quarantine.

I have the honor to be, sir, your obedient servant,

J. M. RUSK,
Secretary.

The SECRETARY OF STATE.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., November 12, 1891.

SIR: I have the honor to acknowledge the receipt of your favor of the 7th instant in relation to the quarantine regulations of Canada, which will doubtless prevent the exhibition at the World's Columbian Exposition of some valuable Canadian stock, and have to inform you that I have given the subject careful consideration.

I feel sanguine that this Department will have pleuro-pneumonia entirely eradicated from this country, and be able to base upon that fact a request to the Canadian government for the entire removal of their quarantine long before the opening of the Exposition. They will have no more reason to quarantine against our cattle than we have to quarantine against theirs, and the failure on the part of Canada to remove such quarantine will be sufficient ground for the President to exercise the authority vested in him by section 5 of the act of Congress, approved August 30, 1890.

I have the honor to be, sir, your obedient servant,

J. M. RUSK,
Secretary.

THE SECRETARY OF STATE.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., November 13, 1891.

SIR: I have the honor to acknowledge the receipt of your favor of the 11th instant inclosing a copy of a letter from a correspondent setting forth the cruelty practiced upon animals on shipboard.

In reply I have the honor to state that the cruelties alleged to have been practiced on cattle in shipment from the United States have, I am glad to say, almost, if not entirely, ceased.

I have the honor to be, sir, your most obedient servant,

J. M. RUSK,
Secretary.

THE SECRETARY OF STATE.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., November 24, 1891.

SIR: I have the honor to request your attention to the provision of Article 66 of the tariff ordinance of the Republic of Mexico, issued May 15, 1891, in relation to the inspection of cattle of all kinds imported into that country.

A translation of the article is herewith inclosed, as furnished to this Department by the courtesy of the Bureau of American Republics. This article requires two veterinary inspections, one to be made in this country by a veterinarian to be appointed by the Mexican consul stationed at the point of shipment, and another to be made at the custom-house at the port of arrival by a veterinarian appointed by the collector thereof; both these inspections to be at the expense of the shipper from this country. This double inspection is a burdensome tax upon our exporters of live animals to Mexico, and is unwarranted as a protection against the introduction of cattle diseases into the Mexican Republic.

This Department, under the act of Congress of March 3, 1891, is authorized to cause to be made a careful inspection of all cattle intended for export to foreign countries, and to give official certificates of health in case said cattle are sound and free from disease. I am of the opinion that such a certificate should be accepted by the Republic of Mexico as sufficient to admit our live stock into that country.

Requesting that you will call the attention of the Mexican Government to this matter, and having confidence that the same will be promptly remedied, and the official certificate of this Department accepted as entitling animals to admittance, so far as health is concerned,

I have the honor to be, sir, your obedient servant,

J. M. RUSK,
Secretary.

THE SECRETARY OF STATE.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., January 12, 1892.

SIR: I have the honor to request that you will give the proper directions for bringing to the attention of the British Government the unjust and discriminating regulations still enforced against animals imported into Great Britain and Canada from the United States.

A full statement of our case in relation to the British regulations was made in my letters to you dated February 18, 1890, and May 20, 1891, and I will, therefore, only briefly review the salient features in this communication.

Since 1879 there has been an order enforced which requires all cattle, sheep, and swine from this country to be slaughtered at the port of landing within ten days after arrival. This regulation is extremely detrimental to one of the most important branches of our export trade, since it entirely prevents animals from going inland to be fed and prepared for market or from being shipped to those markets where at the time of arrival prices happen to be most remunerative. The result is that the sheep and swine trade has been practically destroyed, the shipment of store cattle is entirely prevented, and our shippers, it is estimated, fail to realize as much by about ten dollars per head for fat cattle as is received for the same class of animals from Canada, which are not subject to these regulations.

The prohibition on the introduction of sheep and swine was established because of the alleged existence of foot-and-mouth disease in the United States, but it has been shown that this disease never existed here except in the case of a few small herds of cattle which were imported from Great Britain, and in these cases it was promptly stamped out at the port of entry. There has not been a case of this disease even at the ports since March, 1884, and the regulations of this Department are now sufficiently stringent to prevent any introduction of the contagion.

The order against cattle was based on the existence of pleuro-pneumonia among the dairy cattle of a few small districts on the Atlantic seaboard. This disease, however, has been eradicated from the districts referred to by the prompt slaughter of all diseased and exposed animals. The only district where the disease has been discovered within the past ten months is a small section of the State of New Jersey, where a limited outbreak was discovered in September last. Every diseased and exposed animal was promptly slaughtered, the whole section was held under the most rigid quarantine, premises have been thoroughly disinfected, and I have every reason to believe that the disease has been eradicated.

About eighteen months ago this Department stationed inspectors at the British ports where our cattle are landed to observe the disease, if any, with which they were affected on arrival. During that time, although nearly half a million head have been inspected, but two animals have been considered by the British inspectors to be affected with pleuro-pneumonia. These animals were shipped during the inclement weather of early spring, and were believed by our inspectors to be affected with ordinary pneumonia, brought on by exposure. The history of these animals was traced, and it was found that they could not have been exposed to the contagion of pleuro-pneumonia.

It is apparent from these facts that the prohibition against sheep and swine was made on incorrect information as to the existence of foot-and-mouth disease in the United States, and that justice requires its immediate removal. It is also apparent that there is no longer any danger of our export cattle being affected with pleuro-pneumonia, if they ever were subjected to such danger in this country. With the regulations now in force export cattle are carefully inspected before shipment, and their freedom from contagion is guaranteed.

If, however, the British Government should have any doubts about the safety of cattle shipped from the port of New York, we would be satisfied for the present with an order removing the prohibition from cattle shipped from Chicago by way of Port-

land, Me., Boston, Baltimore, and Newport News. This would insure that no export cattle would go near any district where pleuro-pneumonia had existed during the last two years.

The authorities of Great Britain are expressly given the power by act of Parliament, I understand, to relieve certain sections of any country from the effect of such prohibitions when such country has adopted proper regulations to prevent the spread of the contagious diseases of animals. There is no reason why such a regulation as is above suggested should not be made at once, and its adoption would be a gratifying evidence to our people of a friendly spirit, and of a desire to place no greater hardships on our trade than are believed to be necessary to prevent the introduction of diseases dangerous to the cattle of that country.

It should be noted in this connection that although pleuro-pneumonia has been disseminated over Great Britain for many years, this Government has never adopted a prohibition against the cattle of that country, but has allowed them admission after a reasonable quarantine. It should also be noted that although the sheep and swine of Great Britain are affected by the same diseases as affect the sheep and swine of the United States, no prohibition has been adopted against these animals, but after a few days' quarantine they are allowed to go to any part of the country.

These facts are mentioned in order to show that the regulations of this Government have been framed in a friendly spirit, and with a view to facilitate the trade between the two countries, and I trust that when our case is fully presented to the British Government they will be willing to make such favorable modification of their regulations as is justified by the present condition of affairs in the United States.

The Canadian Government has long enforced a quarantine of ninety days on cattle imported from the United States, on account of the alleged danger of these animals being affected with pleuro-pneumonia. This quarantine entirely prevents the shipment of such animals and is a great hardship to our farmers. For the reasons given above this quarantine should now be removed.

If there are still fears in regard to the State of New Jersey, we would be satisfied to have the quarantine applied to cattle from that State, in case cattle from other States are exempted from its provisions.

Believing that the time has come for a vigorous presentation of these facts,

I have the honor to be, sir, your obedient servant,

J. M. RUSK,
Secretary.

THE SECRETARY OF STATE.

DEPARTMENT OF STATE, *Washington, January 18, 1892.*

SIR: I have the honor to acknowledge the receipt of your letter of the 12th instant relative to the unjust and discriminating regulations still enforced against animals imported into Great Britain and Canada from the United States, and to inform you that our minister at London has been instructed to bring the matter to the attention of the British Government.

I have the honor to be, sir, your obedient servant,

JAMES G. BLAINE.

THE SECRETARY OF AGRICULTURE.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., June 18, 1892.

SIR: I have the honor to acknowledge the receipt of your favor of the 2d instant inclosing copy of dispatch No. 678, of the 9th ultimo, from our minister at London

relative to restrictions on the importation of cattle, sheep, and swine into Great Britain from the United States.

I regret to learn that the Government of Great Britain maintains its position that the cattle landed from the United States affected with lung disease since August, 1890, were suffering from contagious pleuro-pneumonia. I feel very certain that these animals were simply affected with ordinary pneumonia, contracted by exposure to the inclement weather of winter and spring—the season when these cases occurred. The history of the animals, as well as the appearance of the lungs, bears me out in this view. If this conclusion is correct, then the Government of Great Britain will, if it adheres to the policy laid down in its correspondence, maintain its prohibition against the introduction of American live cattle for all time, as cases of pneumonia from exposure in severe weather must continue to occur in spite of any precautions which can be taken.

The United States is now free from contagious pleuro-pneumonia, this disease having been eradicated by the destruction of all diseased and exposed animals. This Government can not, therefore, rest any longer under the imputation of disseminating the contagion of that plague with its export cattle. We are simply asking for justice in this matter, and unless that is granted such measures should be adopted as are likely to secure it.

As a willingness is shown to remove the prohibition against the introduction of American sheep, I would request that Mr. Lincoln be instructed to make such representations to the Marquis of Salisbury as may be necessary to secure the removal of this prohibition as soon as possible under the conditions laid down in the letter of the Marquis of Salisbury to Mr. Lincoln.

I have the honor to be, sir, your obedient servant,

J. M. RUSK,
Secretary.

THE SECRETARY OF STATE.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., July 5, 1892.

SIR: I have just received the following letter, signed by the principal exporters of cattle from the United States to European countries:

We, the undersigned, make the following request: That you will please give such instructions to the men under your employ at the various ports from which cattle are exported to allow the parties hereto to place one man to every thirty-three head of cattle on all steamers leaving the United States for foreign ports. By so doing you will relieve us of unnecessary expenses, and confer upon us all a great favor.

By far the greater number of cattle exported are shipped to Great Britain, the regulations of which country provide as follows:

(13) *Attendance*.—Every consignment of cattle shall be in charge of a responsible foreman, who shall have under him competent assistants numbering with himself one for every twenty-five head of cattle, and proper and suitable accommodation for these persons shall be provided.

The regulations of this Department have also required one man to every twenty-five head of cattle. As it appears from the statement of the exporters, that one man for every thirty-three head of cattle would be sufficient and would considerably lessen the expense of exporting, I would request that your Department present this matter through the proper channels to the British Government and make inquiries as to whether they are willing to modify the requirements of their regulations as above proposed.

I have the honor to be, sir, your obedient servant,

J. M. RUSK,
Secretary.

THE SECRETARY OF STATE.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., July 6, 1892.

SIR: I have the honor to acknowledge the receipt of your letter of the 2d instant, inclosing a copy of a note from the minister of France at this capital, asking that the quarantine regulations of this country relative to imported horned cattle may be set aside in the case of certain milch cows from Brittany and Normandy which French cattle-breeders would like to send to the World's Columbian Exposition.

In regard to these regulations, I would state that they are considered necessary to prevent the introduction of contagious diseases of cattle, and that for this reason they can not be set aside, nor can exceptions to their operation be permitted. At the World's Columbian Exposition there will be a collection of the best animals from all parts of the United States and from many foreign countries, and every precaution should be taken to prevent the introduction of any contagious disease which would spread among them, and which might be disseminated from there to all sections of the country.

While earnestly desiring to facilitate in every proper manner the admission of animals for the purpose indicated, it would be inconsistent for this Department to relax any of the requirements now enforced to prevent the introduction of contagion. Indeed, such action on the part of this Department would tend to weaken the exhibition, as owners of valuable animals are not willing to send them to such a place unless every reasonable precaution is taken to protect them from disease.

I have the honor to be, sir, your obedient servant,

J. M. RUSK,
Secretary.

The SECRETARY OF STATE.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., July 12, 1892.

SIR: I have the honor to acknowledge the receipt of your note of the 9th instant, inclosing a copy of a dispatch, No. 131, from the consul at Havre and also a letter addressed to me by that officer, in relation to permitting the introduction of Norman cattle into this country for exhibition at the World's Columbian Exposition without imposing the quarantine restrictions now in force.

As this request is similar to that contained in the note from the minister of France which you transmitted in your letter of the 2d instant, and to which reply was made on the 6th instant, I would state that, on account of the existence of contagious diseases in France, I must adhere to the decision then made, and require that all such animals should pass the required time at our quarantine stations.

After a struggle of six years' duration we have just succeeded in eradicating the contagious pleuro-pneumonia of cattle from this country, and I can not now take action which might allow its reimportation, and thus undo all that has been accomplished.

I have the honor to be, sir, your obedient servant,

J. M. RUSK,
Secretary.

The SECRETARY OF STATE.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., September 7, 1892.

SIR: I have the honor to acknowledge the receipt of your note of the 30th ultimo, inclosing a letter from Mr. D. H. Talbot, of Sioux City, Iowa, asking that retaliatory measures be adopted to secure the removal, by the Canadian Government, of the

embargo placed upon the shipment of cattle from this country over the Canadian railroads.

In regard to this I would suggest that Mr. Talbot be informed that negotiations are now in progress which it is hoped will secure the removal of the restrictions referred to at an earlier date than this could be obtained by resorting to the extreme measure of retaliation. The case of this Government is continually growing stronger on account of the time that has elapsed since the complete eradication of the contagious pleuro-pneumonia of cattle, the presence of which disease in this country was the alleged cause for the adoption of this embargo; and it would consequently appear that within a short time we may reasonably expect the revocation of these vexatious regulations.

I have the honor, etc.,

J. M. RUSK,
Secretary.

The SECRETARY OF STATE.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., September 24, 1892.

SIR: I have the honor to inclose to you herewith copy of my official proclamation, to issue Monday, the 26th instant, declaring the United States to be free from the disease known as contagious pleuro-pneumonia, and announcing the raising of quarantine therefor in the United States.

I would suggest that a copy of this proclamation be sent to every minister of the United States accredited to a European country, as well as to every consul-general, consul, and consular agent in Europe. As the absolute freedom of this country from this disease, and the dates given since which no case of pleuro-pneumonia has occurred, should have a marked effect in facilitating our live-cattle trade, and in securing the removal of all restrictions imposed upon our cattle trade by European countries, I should be glad to have our representatives abroad instructed to present these facts as strongly as possible to the various governments to which they are accredited. In case my suggestion meets with your approval, I send herewith 150 copies of the proclamation, and, should any more be required by your Department for transmission abroad, I shall be pleased to supply additional copies without delay.

I have the honor to be, sir, your obedient servant,

J. M. RUSK,
Secretary.

The SECRETARY OF STATE.

PROCLAMATION.

ERADICATION OF PLEURO-PNEUMONIA.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY.

To all whom it may concern:

Notice is hereby given that the quarantines heretofore existing in the counties of Kings and Queens, State of New York, and the counties of Essex and Hudson, State of New Jersey, for the suppression of contagious pleuro-pneumonia among cattle, are this day removed.

The removal of the aforesaid quarantines completes the dissolving of all quarantines established by this Department in the several sections of the United States for the suppression of the above-named disease.

No case of this disease has occurred in the State of Illinois since December 29, 1887, a period of more than four years and eight months.

No case has occurred in the State of Pennsylvania since September 29, 1888, a period of four years within a few days.

No case has occurred in the State of Maryland since September 18, 1889, a period of three years.

No case has occurred in the State of New York since April 30, 1891, a period of more than one year and four months.

No case has occurred in the State of New Jersey since March 25, 1892, a period of six months, and no case has occurred in any other portion of the United States within the past five years.

I do, therefore, hereby officially declare that the United States is free from the disease known as contagious pleuro-pneumonia.

Done at the city of Washington, D. C., this 26th day of September, A. D. 1892.

J. M. RUSK,
Secretary.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., October 3, 1892.

SIR: I have the honor to request that you will take the proper steps to bring to the attention of the Government of Great Britain the unnecessary and injurious restrictions which are still enforced upon all shipments of live cattle from the United States to Great Britain and to Canada. The regulations referred to require that all live cattle landed in Great Britain shall be slaughtered on the docks where landed within ten days after quitting the ships which transport them, and that all animals of this species entering the Dominion of Canada shall be held in a quarantine station for a period of ninety days.

It is almost unnecessary to add that such regulations prevent the shipment of cattle, except those intended for immediate slaughter. The trade in pure-bred animals and in those for grazing purposes is entirely prevented, while animals for slaughter do not realize the prices which they otherwise would. These regulations, therefore, cause hardship and loss to our shippers, and entirely prevent a trade which would undoubtedly prove advantageous to both countries.

The regulations in question were adopted in 1879 because of the supposed danger of the introduction of the contagious pleuro-pneumonia from the United States. Since that time, however, this Government has provided for the eradication of that disease, and it no longer exists in any part of the United States. A period of more than six months has elapsed since the last affected animal was slaughtered, and every precaution has been observed during this period to discover the disease in case of its existence. As no cases have occurred subsequent to that time, I have officially declared this country to be free from the contagion, and copies of this declaration were sent you on the 24th ultimo.

It should not be forgotten that during the period these restrictions have been enforced upon our cattle trade, Canadian cattle for sale in this country and for export to Europe have been admitted through the United States ports without detention, and that those from Great Britain and Ireland have been admitted, after a reasonable period of quarantine, although it is well known that pleuro-pneumonia has long prevailed in the British Isles. It may also be said that there is no disposition to enforce this quarantine after the disease in question has been eradicated from Great Britain and Ireland, provided these countries remain free from other contagious diseases dangerous to the stock interests of this country.

I trust, therefore, that the British Government will see the injustice and unneces-

sary character of the present regulations, and will be disposed to revoke them at an early day.

I have the honor to be, sir, your obedient servant,

J. M. RUSK,
Secretary.

The SECRETARY OF STATE.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., November 16, 1892.

SIR: I have the honor to acknowledge the receipt of your note of the 14th instant, inclosing copy of dispatch No. 812, from the chargé d'affaires at London, covering copy of a note addressed by him to the Earl of Roseberry relative to restrictions upon the importation of American live cattle into England.

Concerning this subject, I would state that since my former communication to you an inspector has been sent to each one of the farms from which the cattle came that compose the lot shipped from Cincinnati, one of which was alleged by the English inspectors to be affected with contagious pleuro-pneumonia, when it was slaughtered at Deptford, on October 12, 1892. All of these farms were found to be free from disease, and it is conclusively shown that there never has been any pleuro-pneumonia in the localities where they are situated. It may be stated with equal positiveness that none of these cattle could by any possibility have been exposed to the contagion of that disease on their way to the vessel which transported them to Great Britain.

It should also be added that a specimen of the affected lung of the animal in question has been received from our inspector at London, and carefully examined by the experts of this Department. This specimen presents a small area affected with inflammation, but it has none of the peculiar appearances of pleuro-pneumonia. It is the kind of lesion which might be expected to follow from an injury to the animal or exposure to draughts or changes of temperature on board the ship.

Such alterations of the lungs are not uncommon with animals which undergo the discomforts and exposures incident to long journeys by rail and steamship, and there is no doubt that they will be found in a small portion of American bullocks as long as these are shipped across the ocean. They have also been observed in English cattle shipped to the United States. This being the case, it becomes a serious question if such unimportant and noncontagious affections are to be accepted by the Government of Great Britain as sufficient reason for continuing the restrictions upon the live-cattle trade, which have been in operation for so long a period. It simply means that an unjust discrimination is to be enforced for all time against one of the most important branches of our trade with that country. Against such discrimination this Government has a right to protest in the most vigorous language at its command.

It has recently been stated by the press of Great Britain that a cow shipped to that country from Canada was officially pronounced to be affected with contagious pleuro-pneumonia, that over one hundred head of cattle exposed to it have been slaughtered, and that an order has been issued requiring all Canadian cattle to be slaughtered on the docks where landed.

With these official statements before this Department, it becomes necessary to consider what restrictions are to be placed by this Government upon cattle coming into the United States from Canada.

By the expenditure of a large sum of money we have eradicated pleuro-pneumonia, and I am positive that the country is now free from the contagion of that disease. It is an imperative duty to protect our herds from it in the future, and if Canada is officially declared by the British Government to be an infected country, there is nothing left for us to do but to enforce quarantine regulations in connection with

all shipments of cattle from Canada to the United States. I should like to be informed if the Government of Great Britain has any reasons to offer why the United States should not apply the same measures to Canadian cattle coming to the United States which are enforced when such cattle are landed in England and Scotland. Personally, I am of the opinion that the same error has been made in diagnosing the disease affecting the Canadian cow which was made in connection with the American bullocks, and for that reason I have delayed the quarantine restrictions in the hopes that a further investigation would be made and a more liberal policy adopted by the British Government. If such is not to be expected, however, then I see no alternative but to apply the same regulations and for the same reason to cattle imported into this country from Great Britain and its dependencies.

Requesting that the proper representation of this subject be made to that Government, I have the honor to be, sir,

Your obedient servant,

J. M. RUSK.

Secretary.

The SECRETARY OF STATE.

U. S. DEPARTMENT OF AGRICULTURE,

OFFICE OF THE SECRETARY,

Washington, D. C., February 2, 1893.

SIR: I have the honor to acknowledge the receipt of your note of the 26th ultimo, inclosing a copy of dispatch No. 897, from the United States minister at London, relative to the restrictions upon the admission of American cattle into Canada, this dispatch being accompanied by a copy of a note from the Earl of Roseberry on the same subject.

Concerning this dispatch and also a former one, No. 857, from the chargé d'affaires *ad interim* at London, which inclosed a note of the same tenor from the Earl of Roseberry, relative to the admission of American cattle into Great Britain, I desire to state in the most positive terms that this Department does not admit the correctness of the opinion of the Canadian minister of agriculture that pleuro-pneumonia exists in New Jersey, nor the conclusion of the veterinary officers of the board of agriculture that animals affected with this disease have been found among cattle shipped from the United States to Great Britain. On the contrary, I must express an emphatic protest against such unjust and unfounded conclusions.

There has not been a case of pleuro-pneumonia in New Jersey since March 26, 1892, a period of more than ten months. On September 26, 1892, I issued a proclamation stating that there had not been a case of pleuro-pneumonia in the United States for a period of six months, and that the contagion had been entirely eradicated from this country. I am at a loss to understand how the Canadian minister of agriculture can state that he believes this disease still "continues to exist in New Jersey, and in relation to other parts of the United States he has not been furnished with adequate proof of its complete extinction." The proclamation above referred to was an official statement that the disease no longer existed in this country, and it was not made until a period of six months had elapsed after the last case had been disposed of. The usual courtesy shown by one friendly government to another would seem to require that such official statements should be accepted until positive evidence to the contrary could be produced.

In regard to the note of the Earl of Roseberry dated November 30, 1892, in which a tabulated statement is made alleging the discovery of ten cases of pleuro-pneumonia in American cattle landed in Great Britain from October 7, 1892, to November 6, 1892, inclusive, it should be stated that no evidence has been cited beyond the mere assertion of the veterinary inspectors that the cattle in question were affected with

the disease named. On the contrary, the American inspectors stationed in Great Britain, by the courtesy of Her Majesty's Government, are positive that the animals referred to were not affected with contagious pleuro-pneumonia, but with ordinary noncontagious broucho-pneumonia or interstitial pneumonia, which is caused by exposure and not by contagion.

When the case of the animal shipped on the steamship *England*, and entered in the table opposite the date of October 7, was under discussion, the veterinary officers of the board of agriculture kindly permitted a section of the affected lung to be sent to this Department for examination. This was the first case reported after the issuance of my proclamation announcing the eradication of the disease, and it was consequently regarded as a test case. A careful examination of the lung mentioned proved that it was affected to a moderate degree with ordinary interstitial pneumonia, and that there were none of the peculiar characteristics of contagious pleuro-pneumonia to be found in it. The animal was also traced to the farm on which it had been fed, and it was clearly established that there never had been a case of pleuro-pneumonia in that section of the country. The route to the seaboard by which it was transported was also followed, and it was shown that there was no opportunity for contagion from the time it left the farm until it was placed on board the steamer.

During all the period since the disease was eradicated a special inspection has been maintained by a large force of veterinarians in the districts where it had existed, and an inspection of the internal organs of cattle is made at all the great slaughterhouses of the country. If pleuro-pneumonia exists in the United States our inspectors would certainly have found it, either in the acute or chronic form, in much less time than has passed since the last case was discovered.

These are facts to which the Government of Great Britain should be willing to give careful consideration. It is well known that for many years Prof. Williams and other distinguished veterinarians of Great Britain have been convinced that the veterinary officers of the board of agriculture were mistaken in their conclusion as to the nature of the disease which they have found in the lungs of American cattle landed in England. Prof. Nocard, the eminent veterinary authority of France, who made a careful investigation of a lung disease found in American cattle shipped to France, is positive that the malady is not contagious. He has since been shown specimens of the affected lungs from American cattle pronounced by the British veterinarians to be pleuro-pneumonia, and he identifies the disease with that previously studied by him, and is positive that it is not pleuro-pneumonia.

In view of the facts mentioned above, and considering that the veterinary inspectors of the board of agriculture have not discovered a single case of disease in American cattle which presented the characteristic lesions of contagious pleuro-pneumonia, I must reaffirm my statement that this country is free from that disease and protest against contrary assertions from the governments of other countries.

It is not denied that the Government of Great Britain may properly take such action as is considered necessary to protect the stock interests of the United Kingdom from contagious diseases, but it may at the same time be asserted that that Government has no right to put the stigma of contagious disease upon the great export trade of this country in live cattle without better evidence than has so far been produced.

I trust that this view of the question will be placed before the Government of Great Britain and that just treatment may yet be accorded to the cattle exporters of the United States.

I have the honor to be, sir, your obedient servant,

J. M. RUSK,
Secretary.

THE SECRETARY OF STATE.

CORRESPONDENCE RELATING TO PROHIBITIONS AGAINST IMPORTATIONS OF AMERICAN MEAT PRODUCTS.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., November 22, 1889.

SIR: I have the honor to acknowledge the receipt of your letter of the 19th instant, inclosing a copy of a report from the American consul at Cologne, Germany, upon a shipment of beef cattle that were recently sent from the United States to that country.

In this connection I would state that the following dispatch has recently appeared in the newspapers of this country:

BERLIN, *November 20.*

In the Reichstag the motion to rescind the law prohibiting the importation of cattle was rejected, as was also a motion permitting free importation of swine shipped directly to slaughterhouses.

I would respectfully request information as to whether there is such a law in force in Germany as indicated in the above dispatch which prohibits the importation of cattle from the United States.

Thanking you for the information contained in the report, I am,
Very respectfully, yours,

J. M. Rusk,
Secretary.

The SECRETARY OF STATE.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., February 18, 1890.

SIR: I have the honor to invite your attention to certain regulations and prohibitory restrictions which are enforced by a number of European governments to the great detriment and in some cases to the destruction of the trade in live animals and meat products from the United States, and to request that you take such action as may be possible looking to a removal of such restrictions or their modification in favor of American producers.

In 1879 the British Government made regulations that all cattle, sheep, and swine from this country should be slaughtered at the wharves within ten days from time of landing. The effect of this order is to entirely exclude store cattle and sheep shipped for fattening purposes; and it considerably reduces the amount which can be realized for fat animals, because these can not be held until they have recovered from the effects of the voyage, and also because the buyers know that they must be disposed of within a limited time.

The order in regard to cattle was issued on account of the existence of the contagious pleuro-pneumonia of cattle in this country, but since its issuance this disease has been almost entirely eradicated. It no longer exists in any section from which export steers are obtained, and it is confined to two counties on Long Island and one

in New Jersey, all of which are in strict quarantine. The stock yards which might have been contaminated have been thoroughly disinfected and there is no longer danger of exporting the contagion of this disease.

During the year 1889 a number of cases of pleuro-pneumonia were reported by the English inspectors among cattle landed from the United States, but this Department regards such reports as based upon errors of diagnosis for the reasons given above. This conclusion is considered the more evident because the returns which have been received show that in the greatest number of cases but a single animal was found affected in any one cargo, which would be unlikely with a contagious disease. It is also admitted by most veterinarians that there are seldom any typical characters found in contagious pleuro-pneumonia which enable the inspectors to distinguish it from the sporadic or noncontagious inflammation involving the same organs. In all such cases the diagnosis must be based upon a history of contagion or upon a discovery of a number of animals in the same lot which are similarly affected, a fact which indicates contagion. In the cases reported by the English inspectors during 1889 there has neither been a history of contagion nor a sufficient proportion found affected to indicate a contagious disease. It would, therefore, seem highly probable that the disease observed in these steers was the result of injuries or exposure incident to the voyage.

As a preliminary measure for securing information in regard to the character of the disease found in the American cattle slaughtered in England, I would suggest that the Department of State make arrangements with the English Government by which one or more of the veterinary inspectors of this Department can be stationed at the English "foreign animals wharves." These inspectors would observe any affected animals which might be discovered, and by promptly notifying this Department it would be possible to trace the history of such animals and determine definitely if they had ever been exposed to a contagious disease.

The thorough control which is now maintained over the small areas affected with pleuro-pneumonia in this country, and the near approach of the time when this disease will be entirely eradicated, make it desirable that negotiations should be begun looking to the withdrawal of the British restrictions. The time is opportune for this, since the Scotch and English farmers are agitating to secure the same result so that they can obtain cattle for feeding from the United States. Their present supply comes mostly from Ireland, where prices are much higher than here and where the danger from pleuro-pneumonia is incomparably greater.

The restrictions on the importation of sheep into Great Britain were based upon the alleged importation of foot-and-mouth disease from this country. As this disease has never existed in the United States except in two or three instances when cattle landed from England were found affected by it, and as it has never been allowed to spread here, it is evident that the sheep in question must have contracted the disease on vessels that had previously been infected by British cattle. The restrictions are consequently a great injustice and should have been removed long ago. Their effect upon the trade is seen by reference to the statistics of the English agricultural department, which show that in 1879 the number of sheep imported from the United States was 119,350, and that it rapidly decreased until in 1888 it was but 1,203, though in 1889 it increased, according to the statistics of the United States Treasury Department, to 18,877.

The German regulations in regard to American cattle, as communicated in your favor of December 3, 1889, prevent the development of a profitable trade with that country. The single shipment made there last year yielded good returns, but the statement that was immediately telegraphed here to the effect that further imports of American cattle had been prohibited at once arrested all efforts in that direction. While any quarantine of our cattle is an unjust requirement, a four weeks' detention would seem to be entirely unnecessary with cattle designed for immediate slaughter. Probably if this matter were brought to the attention of the German Govern-

ment more favorable regulations could be obtained. At all events the State Department could be of service to the cattle industry of this country by obtaining exact information as to the regulations which would be enforced against cattle landed for slaughter. There appears to be at present considerable uncertainty as to whether such animals are entirely prohibited, or whether they may be landed and go to any part of the Empire after four weeks of quarantine, or whether such quarantine must necessarily be enforced with animals that might be at once slaughtered at the port of landing.

There have also been press telegrams from Germany which stated that American dressed beef and canned meats either had been or were about to be excluded. I would suggest that you obtain reliable information in regard to this matter and take such steps as you may consider proper to protect the interests of our exporters.

The prohibition of American pork by both Germany and France is still continued notwithstanding the demonstrated healthfulness of this article of food. This regulation was made with a view of preventing trichinosis among consumers, but it has been shown that no case of this disease was ever produced in either country by American meats; indeed, the curing process through which all exported meats must pass is a sufficient safeguard against this disease.

The surplus of meat-producing animals in the United States at present is such that prices are below the cost of production, and consequently it is extremely important that we should increase our exports of live cattle and meat products if this can possibly be accomplished.

Any further information on this subject in the possession of this Department which you may desire will be promptly supplied.

Very respectfully,

J. M. RUSK,
Secretary.

The SECRETARY OF STATE.

DEPARTMENT OF STATE, *Washington, March 4, 1890.*

SIR: I have the honor to acknowledge the receipt of your letter of the 18th ultimo, concerning the prohibitory regulations and restrictions of the Governments of France, Germany, and Great Britain, in the matter of American live animals and hog products.

A copy of your letter has been communicated to the ministers of the United States at Berlin, London, and Paris, to the end that they may make all possible representations upon the subject to the governments to which they are respectively accredited, in the hope of obtaining a revocation of the unnecessary measures, or their material modification, in the interest of an important industry of the United States.

Upon receipt of the replies in each case, I shall duly apprise you thereof.

I have the honor to be, sir, your obedient servant,

JAMES G. BLAINE.

The SECRETARY OF AGRICULTURE.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., October 20, 1890.

SIR: I have the honor to inform you that I have this day forwarded to your Department 250 copies of the regulations prescribed by me for the inspection and quarantine of imported animals arriving in the United States, a copy of the same being herewith inclosed.

I would suggest that American consuls abroad be furnished with copies of these

regulations, and that they be instructed to act in accordance therewith; also that the representatives of foreign governments be notified of their effect.

I have likewise forwarded you 100 copies of the regulations issued by this Department for the inspection of salted pork or bacon which are to be exported to foreign countries, and would make a request similar to the above as to the notification of American consuls and foreign governments of their issuance.

I have the honor to remain, sir, your most obedient servant,

J. M. RUSK,
Secretary.

The SECRETARY OF STATE.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., October 31, 1890.

SIR: I have the honor to inform you that this Department will be ready on November 10, proximo, to execute the provisions of the act of August 30, 1890, providing for the inspection of meats for export.

It is respectfully suggested that this information may be useful to those diplomatic officers of the Department of State who are conducting negotiations looking to the removal of the restrictions upon our export trade in meats. It is my intention to enforce this law with vigor and to provide a thorough and complete scientific inspection of all our pork products.

I have the honor to be, sir, your obedient servant,

J. M. RUSK,
Secretary.

The SECRETARY OF STATE.

DEPARTMENT OF STATE, *Washington, November 8, 1890.*

SIR: I have the honor to acknowledge the receipt of your letter of the 31st ultimo, informing me that your Department would, on and after the 10th instant, be prepared to execute the provisions of the act of August 30, 1890, providing for an inspection of meats for export.

In compliance with your suggestion I at once informed by telegraph our legations at London, Paris, and Berlin, and have since sent a circular of instruction to our ministers in Mexico and all the European countries, directing them to inform the governments to which they are accredited that all pork products for export would, from the date above mentioned, be subjected to a thorough and complete scientific inspection.

If you deem it desirable that this instruction should be sent to our ministers in any other countries, your suggestion will be immediately carried out.

I have the honor to be, sir, your obedient servant,

JAMES G. BLAINE.

The SECRETARY OF AGRICULTURE.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., January 9, 1891.

SIR: I have the honor to acknowledge the receipt of your favor of the 5th instant, with inclosure of a dispatch from the consul-general at Berlin announcing the raising of the prohibition by Germany of the importation of swine, swine flesh, and sausage of Danish, Swedish, and Norwegian origin into that country.

It appears from said dispatch that the only prohibition now in force against the importation of swine and swine products into Germany is the one maintained against such importation from the United States. For ten years Germany has continued this unjust and unwarranted exclusion of American pork from her domain, and I believe the time has now come when the German Government should be given to understand that there are economic reasons why this edict should be revoked. The allegation made in 1880, at the time of the first edict issued by the German Government prohibiting the importation of American pork into that country, has been repeatedly shown by this Department, by special investigations and reports placed in the hands of your officers, to be untrue, and it does not comport with the dignity and self-respect of this Government to longer tolerate such a policy as is being pursued by the Government of Germany against the food products of the United States.

I would respectfully urge that our minister at Berlin be promptly instructed to make a final appeal to the German Government to remove the discrimination made against the animal products of this country.

Should this appeal fail I shall feel it my duty to call the attention of the President of the United States to this unwarranted discrimination, and recommend the suspension, by proclamation, of the importation into the United States from Germany of such articles as he may think advisable, under the provisions of section 5 of the act of Congress approved August 30, 1890.

I have the honor to be, sir, your obedient servant,

J. M. RUSK,
Secretary.

THE SECRETARY OF STATE.

DEPARTMENT OF STATE, *Washington, January 13, 1891.*

SIR: I inclose herewith for your information a copy of a letter from the Secretary of Agriculture relative to the recent action of the federal council of the German Empire by which the importation of live cattle from Austria-Hungary into Germany be permitted upon certain conditions; and to the proposed decree for permitting the importation of hogs, pork, and sausage into Germany from Sweden, Norway and Denmark.

You will observe that the Secretary of Agriculture urges that a final appeal be made to the German Government to remove the discriminations now made against this country; and that he states, furthermore, that if the appeal fails, he shall then feel it to be his duty to call the attention of the President to the subject and to "recommend the suspension, by proclamation, of the importation into the United States from Germany of such articles as he may think advisable, under the provisions of section 5 of the act of Congress approved August 30, 1890."

In the absence of any recent report from your legation relative to the subject the Department is not prepared to do more than to authorize you to make any representations to the minister of foreign affairs, which, in your discretion, you may deem expedient from your knowledge of the present temper of the German Government.

Requesting you to report to the Department as soon as practicable the present condition of the question with your views relative to the same, when further instructions will be given,

I am, sir, your obedient servant,

JAMES G. BLAINE.

WILLIAM WALTER PHELPS, Esq.,
Berlin.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., March 16, 1891.

SIR: I have the honor to submit herewith certain correspondence relative to the prohibition now enforced by the German Government against pork exported from the United States. This prohibition was decreed for the alleged reason that our pork was unwholesome and endangered the health of the consumers. It has been shown again and again, and is admitted by some of the best scientists of Germany, that there are no grounds for such an assumption, and that American pork is equal to any produced in the world, both as to its food value and its freedom from any unwholesome qualities.

In order that the wholesomeness of every package of our pork going to foreign countries might be guaranteed, Congress passed the act of August 30, 1890, and in accordance with this act I issued, under date of September 12, 1890, regulations providing for the inspection and certification of salted-pork products. Copies of this act and of these regulations were promptly transmitted through the State Department to the German Government.

Under date of January 5, 1891, the Department of State transmitted to me a copy of a dispatch from the consul-general at Berlin announcing the removal of the prohibition which Germany had enforced up to that time against the importation of swine, swine flesh, and sausage of Danish, Swedish, and Norwegian origin. I called the attention of the honorable Secretary of State to this action, which emphasized the discrimination against the United States, as this is the only country against which such a prohibition is now enforced, and urged that our minister at Berlin should be promptly instructed to make a final appeal to the German Government to remove the discriminating prohibition. And it was distinctly stated that should this appeal fail I should feel it my duty to bring the matter to the attention of the President and recommend the suspension, by proclamation, of the importation into the United States from Germany of such articles as might be thought advisable under the provisions of section 5 of the act of Congress approved August 30, 1890.

It appears from the correspondence that a copy of this communication was transmitted to our minister at Berlin and that the matter has again been brought to the attention of the German secretary of state for foreign affairs, though not in as emphatic a manner as is desirable.

At this writing the press dispatches contain the information that Herr Von Bötticher has just stated in the Reichstag that our regulations for the inspection and certification of pork are unsatisfactory, and therefore the German Government does not intend to rescind the prohibition.

Under the act approved March 4, 1891, this Department is authorized and prepared to make a microscopic inspection of pork for exportation, if such an inspection is necessary, and to certify to such inspection. But, on account of the great expense involved, it would be manifestly unjust for Germany to require such an inspection of American pork unless the same regulations were made to apply to pork imported into Germany from other countries.

In view of these facts I most earnestly recommend that steps be at once taken looking to the enforcement of section 5 of the act of Congress approved August 30, 1890, by excluding from importation into the United States such articles of German origin as may be considered advisable.

I have the honor to be, sir, your most obedient servant,

J. M. RUSK,
Secretary.

The PRESIDENT.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., March 26, 1891.

SIR: I have the honor to inclose to you herewith printed copies of the rules and regulations prescribed by me for the inspection of live stock and their products under the act of Congress of March 3, 1891, and to request that these copies be transmitted without delay to the United States ministers accredited to foreign governments in Europe.

I have the honor to remain, sir, your obedient servant,

J. M. RUSK,
Secretary.

The SECRETARY OF STATE.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., June 3, 1891.

SIR: I have the honor to make inquiry as to what steps are being taken by our minister to France for the removal of the restrictions maintained by that country on the importation of American meats.

Some time has elapsed since the passage of the act of Congress of March 3, 1891, providing for the inspection of live stock and their products in this country and their certification for export to foreign countries, and the issuance of the regulations made by this Department for the proper execution of said law, and I am of the opinion that the time has arrived when France should be requested to indicate its intention, in view of this system of inspection, of removing its prohibition against our live-stock products.

My attention has been called to legislation now pending in the Chamber of Deputies of France, having for its object the increasing of duties on meats imported into that country, and to the nature of the debate there carried on having reference especially to American meats.

I would ask whether this proposed legislation contains any provision looking to the removal of the existing prohibition against the introduction of American hog products into France, and that our minister to France be requested to furnish this Department full information as to the effect of said legislation, when enacted, on the agricultural products of this country.

I would further urgently request that our minister to France be instructed to insist in every way possible upon the early removal of the present restrictions on our animal products.

I have the honor to be, sir, your most obedient servant,

J. M. RUSK,
Secretary.

The SECRETARY OF STATE.

DEPARTMENT OF STATE, *Washington, D. C., June 8, 1891.*

SIR: Acknowledging the receipt of your letter of the 3d instant, inquiring what steps are being taken by our minister to France for the removal of the restrictions upon the importation of American meats, and requesting that our minister be instructed to take further action relative to the subject, I have the honor to inform you that a copy of your letter has been communicated to the legation with the desired instructions.

I have the honor to be, sir, your obedient servant,

WILLIAM F. WHARTON,
Acting Secretary.

The SECRETARY OF AGRICULTURE.

DENMARK.

[Translation.]

DECREE touching the importation of pork and other unmanufactured swine products from the United States of North America.

MINISTRY OF THE INTERIOR,
September 8, 1891.

To all whom it may concern:

The prohibition notified in the decree of the ministry of the interior of March 10, 1888, against the importation into this country from the United States of North America of pork and other unmanufactured swine products, including swine bladders and unpurified steam lard, is hereby withdrawn as regards those products which are furnished with certificates under the hands of the proper authorities to the effect that the article in question, before leaving the United States, has been subjected to an examination in compliance with the legislation in force in the States and has been declared at such examination to be found untainted, sound, and fit for human food.

This decree takes effect at once.

INGERSLER.

GERMANY.

We, William, by the grace of God German Emperor, King of Prussia, etc., decree in the name of the Empire, the assent of the Bundesrath having been obtained, what follows:

1. The decree respecting the prohibition of the importation of swine, swine's flesh, and sausages of American origin, of March 6, 1883 (Imperial Law Gazette, page 31), ceases to be of force for living swine, as well as for such products as are provided with an official certificate stating that the flesh has in the land of its origin been examined, pursuant to the rules in force there, and has been found free from qualities injurious to health.

2. The chancellor of the Empire is empowered to adopt appropriate measures for the control of the character of the swine flesh imported from America.

3. This decree enters into force on the day of its publication. In testimony whereof our own proper signature and the Imperial seal are hereto affixed.

Done at Castle Schwarzman, the 3d of September, 1891.

WILLIAM.

[SEAL.]

VON CAPRIVI.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., September 30, 1891.

SIR: The action of the Governments of Germany and Denmark in removing the prohibition against the introduction of American pork into their respective countries, when the same is accompanied by a certificate of inspection under the act of Congress of March 3, 1891, demonstrates that the meat-inspection laws of this country, and their execution, are so thorough that the United States is warranted in demanding the removal of similar prohibitions maintained against our meat products by other foreign governments.

As heretofore advised by you, France will undoubtedly remove its restrictions against our pork products during the coming month. There are, however, other

foreign countries with which the United States maintained a larger export trade prior to their edicts of prohibition. These are Austro-Hungary, Italy, Portugal, and Spain.

I have, therefore, to request that our representatives in these countries be instructed to urge upon the governments of the same the justice of removing the prohibition they have so long maintained against our pork products, and to insist on the same being done without delay.

I have the honor to be, sir, your obedient servant,

J. M. RUSK,
Secretary.

The SECRETARY OF STATE.

ITALY.

[Inclosure 2, in No. 282.—Translation.]

1891. *Marine Health Order. No. 2.*

The minister of the interior, believing that, in consequence of the putting into effect on the part of the Government of the United States of America of the law entitled "Act providing for an inspection of meats for exportation," there is afforded a sufficient guarantee of the salubrity of the meats which are exported from the states of that confederation;

In virtue of the law of December 22, 1888, No. 5849 (series 3), on the tutelage of public hygiene and health, decrees that from now on it is permitted to import into the Kingdom swine flesh, prepared and preserved, coming from the United States of America, provided it be accompanied by a certificate from the competent authority proving that said meats were subjected to the sanitary inspection and pronounced healthy.

The prohibition enforced with the marine health order of February 20, 1879, No. 5, remains in force in regard to the importation from the said States of live swine.

The prefects of maritime provinces and the officers of the ports of the Kingdom are charged with the execution of the present.

G. NICOTERA,
Minister.

ROME, *October 17, 1891.*

DEPARTMENT OF STATE, *Washington, December 5, 1891.*

SIR: I have the honor to inform you that I have received a télégram from our minister at Vienna stating that a decree had been issued, to take effect the 4th instant, for the admission of American pork into Austria.

I have the honor to be, sir, your obedient servant,

JAMES G. BLAINE.

The SECRETARY OF AGRICULTURE.

SPAIN.

UNITED STATES PORK.

The following instructions, in a royal decree dated yesterday, have been issued by the ministry of the interior:

First. Pork coming from the United States is free from microscopical inspection and the payment of the correspondent duties established in the second section of the decree of November 9, 1887, always [provided] that the cases that contain

this merchandise come accompanied with a certificate of origin and of inspection made in accordance with the law promulgated in that nation the 3d of March, 1891, and the assurance given in this manner that the above-mentioned meats do not contain trichinæ or any other cause of danger to the health of the consumers.

Second. Pork from the above-mentioned country that does not come accompanied with a certificate which gives it this excellence shall continue to be subject to that which is ordained in the above-mentioned section 2 of the royal decree of November 9, 1887. It is the duty of the medical directors (health officers) and the experts to verify this inspection in the custom-houses of the frontier to report monthly to the general direction of health and safety, the number of cases inspected and nature of the contents, whence they come, name of the ship in which they come, and the result of the inspection.

The prohibition established by the royal decree of February 28 and July 10, 1880, against introducing into the Peninsula and adjacent islands grease, coming from the United States of America, which has not been obtained by fusion (the action of fire) still continues in effect. Grease prepared in this manner (fusion) and lard without any flesh continues free from inspection and from bringing a certificate of inspection from the place from whence it comes.

The general direction of health and safety will inform the proper officials concerning the law and regulations of the United States of America, above referred to, in order that they may be carried out.

Sent May 22, 1892.

FRANCE.

[Translation.]

DECREE OF DECEMBER 4, 1891.

The President of the French Republic, on the report of the minister of agriculture: In view of the decrees of February 18, 1881, and of December 28, 1883, by which American pork was excluded; in view of the sanitary inspection now provided by the Government of the United States for pork intended for export; in view of the opinions expressed by the minister of foreign affairs, of finance, of the interior, and of commerce and industry, decrees as follows:

ARTICLE 1. Salted pork meats from the United States can be imported into France at points to be fixed by subsequent decree.

ART. 2. Before discharge of cargo the importer must produce for each shipment a certificate from the inspector of the Department of Agriculture designated by the Government of the United States for the inspection of the slaughterhouses, certifying that the meats are from healthy animals and suitable for human food.

The boxes must bear the official stamp of this inspector. No shipment can be admitted which does not comply with these requirements.

ART. 3. After their discharge these meats shall be examined by sanitary inspectors appointed by the minister of agriculture and instructed to make sure of their healthy condition and of their being properly salted.

All meat found unwholesome shall be destroyed in the presence of these inspectors.

ART. 4. The custom-house shall permit the meats mentioned in article 1 to enter the territory of the Republic only after seeing the certificate of the inspectors provided for by article 3, certifying that the meats have been found to be healthy and suitable for consumption.

ART. 5. The expenses of the inspection prescribed by article 3 shall be paid by the importers, according to a tax fixed by a decree issued on the proposal of the minister of agriculture on the advice of the consultation committee on epizootics.

This tax shall be paid to the custom-house collectors.

ART. 6. The decrees of February 18, 1881, and of December 28, 1883, are repealed, as well as all other regulations which may be in conflict with the present decree.

ART. 7. The minister of agriculture, the minister of the interior, the minister of commerce, industries, and the colonies, and the minister of finance, are intrusted with the execution of the present decree, which will go into effect on the 1st of January, 1892.

Made at Paris, December 4, 1891.

CARNOT.

By the President of the Republic.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., January 6, 1892.

SIR: I have the honor to acknowledge the receipt of your favor of the 4th instant, inclosing a dispatch from our minister at Paris, relative to the American pork question in the French Senate.

It would appear from this dispatch that the French Government has definitely determined to enforce the maximum duty on American pork imported into that country.

The decree revoking the prohibition provides as follows:

ART. 2. Before discharge of cargo the importers must produce for each shipment a certificate from the inspector of the Department of Agriculture, designated by the Government of the United States, for the inspection of the slaughterhouses, certifying that the meats are from healthy animals and suitable for human food. The boxes must bear the official stamp of this inspector. No shipment can be admitted which does not comply with these requirements.

ART. 3. After their discharge these meats shall be examined by sanitary inspectors appointed by the minister of agriculture, and instructed to make sure of their healthy condition, and of their being properly salted.

ART. 5. The expenses of the inspection prescribed by article 3 shall be paid by the importers according to a tax fixed by a decree issued on the proposal of the minister of agriculture on the advice of the consultation committee on epizootics.

After a thorough inspection has been made by the Government of the United States, it is unjust and unreasonable to require our shippers to pay the expense of another inspection at the French ports. This tariff and these inspection charges will result in a prohibition as absolute as the decree which has just been revoked.

In case the French Government persists in maintaining these unjust and discriminating measures against our meat trade, I shall feel it my duty to recommend to the President to take such action as is contemplated by section 3 of the tariff act and section 5 of the act approved August 30, 1890.

I have the honor to be, sir, your obedient servant,

J. M. RUSK,
Secretary.

The SECRETARY OF STATE.

DEPARTMENT OF STATE, *Washington, January 13, 1892.*

SIR: I have the honor to acknowledge the receipt of your letter of the 6th instant, concerning the question affecting the importation of American pork before the French Senate, and to state that the subject is having consideration in connection with the pending efforts to reach an understanding in regard to reciprocal commercial favors under section 3 of the tariff act of 1890.

I have the honor to be, sir, your obedient servant,

JAMES G. BLAINE.

The SECRETARY OF AGRICULTURE.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., February 10, 1892.

SIR: I have the honor to inclose, for your information, a translation of the instructions of the French Government to the veterinary inspectors who are charged with the sanitary inspection of salt pork from the United States. The paragraphing and numbering of the paragraphs have been done in this Department for convenience of reference, but otherwise the translation is a literal one.

An examination of these regulations shows that they are unnecessarily burdensome to our shippers, and that the trade in pork products can not be expected to prosper if they are enforced. In the first place no pork is admitted unless thoroughly cured. The standard for thoroughly cured meats must be an arbitrary one, and under this provision any or all of our meats may be rejected or the trade may be harassed and ruined by a few unfriendly inspectors. The only object in requiring such meat to be thoroughly cured is to guard against the danger from trichinæ, but this Government has established an expensive system of microscopic inspection to remove this danger, and it was in consideration of this inspection that the prohibition was removed. Our inspected pork should, therefore, be admitted without regard to the degree of salting, if it is undamaged and free from taint.

The extreme injustice of these regulations is seen more particularly by reference to paragraph 6. Notwithstanding the fact that all insufficiently cured meat is refused entrance, there is here a provision that all meat which the inspector may consider to be insufficiently cured shall be submitted to a microscopic examination. Why should our shippers be put to the expense and delay caused by a microscopic inspection of pork which under no circumstances will be admitted into France? If the meat is refused entrance, that should end the matter and the shipper should be allowed to forward his consignment at once to more friendly markets. But to hold the meat, which has already been refused entrance, for a microscopic examination, to destroy such of this as the inspectors believe to be infected with trichinæ, and then to reject all that is not found affected, is a wanton outrage which should not be submitted to by this Government.

Again, in paragraph 8, it is provided that meats in brine shall be considered insufficiently cured and shall be rejected if the brine is not of a certain arbitrary degree of density. This, also, is an unjust and unreasonable requirement. If the meat is free from taint or damage it is perfectly wholesome, and to reject it because the brine does not reach an arbitrary standard of density is a discrimination against this country which can not be justified on sanitary or other grounds.

In this connection I beg to call the attention of your Department to the condition of trade between France and the United States. In 1878 the balance of trade was in round numbers \$12,000,000 in our favor; in 1879 it was \$39,000,000 in our favor; in 1880 it was \$31,000,000 in our favor; in 1881 it was \$24,000,000 in our favor. In 1882 came the prohibition of our pork products and a more pronounced attitude against our trade, and we find the balance of trade reversed, and, instead of being in our favor, it suddenly turns nearly \$39,000,000 against us. From 1882 to the present the balance of trade has been steadily unfavorable, varying from \$10,000,000 to nearly \$40,000,000 a year. In 1891 it was \$17,000,000 against us.

These facts show how much more favorable our laws and regulations have been for the maintenance of French trade than those of France have been for the encouragement of American trade.

As our exports to France consist chiefly of agricultural products, I feel free to say that in my opinion this condition of the trade should be taken into account and a determined effort should be made to secure such modifications of the French regulations as will develop our exports to that country and make them equal to the imports. If the French Government is unwilling to meet such a demand and remove

its unreasonable and unjust discriminations against our shippers, then this Government owes it to our people to enforce the remedy which Congress has already provided for such cases.

I have the honor to be, sir, your obedient servant,

J. M. RUSK,
Secretary.

The SECRETARY OF STATE.

DEPARTMENT OF STATE, *Washington, March 14, 1892.*

SIR: I have the honor to acknowledge the receipt of your letter of the 10th ultimo, relative to the regulations adopted by the French Government for the inspection of American meats, and to inform you that suitable instructions have been given to our legation at Paris in regard to the subject.

I have the honor to be, sir, your obedient servant,

WILLIAM F. WHARTON,
Acting Secretary.

The SECRETARY OF AGRICULTURE.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., April 25, 1891.

SIR: I have the honor to inform you that I am advised that the Government of Belgium requires that carcasses of dressed beef imported into that country from the United States shall be accompanied by the lungs of the animals, attached to said carcasses.

This requirement is a virtual prohibition of the importation into Belgium of dressed beef from this country. The object which Belgium had in requiring the lungs to accompany the animal was no doubt a sanitary measure, to enable the officers of that Government to determine upon the arrival of the carcass whether the animal had been affected with any disease of the lungs.

The enactment by the Congress of the United States of the act of March 3, 1891, which provides for the inspection of all animals slaughtered for export to foreign countries, and requires both an ante mortem and a post mortem examination, the carcasses of the animals to be accompanied by a certificate of healthfulness by inspectors of the United States, and said carcasses to be properly labeled for purposes of identification, should be sufficient grounds for an application to the Government of Belgium to remove this restriction.

I have to advise you that the work of inspection of meat products has been commenced by this Department under the regulations prescribed, of date March 25, 1891, and that the carcasses of all dressed beef now being exported to foreign countries from the United States will be accompanied by a certificate of healthfulness and be properly tagged for purposes of identification.

In view of this, I have to request that the attention of our minister at Brussels be called to the matter and that he be directed to present these facts to the Government of Belgium with a view of securing the removal of the restriction referred to above.

I have the honor to be, sir, your most obedient servant,

J. M. RUSK,
Secretary.

The SECRETARY OF STATE.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SECRETARY,
Washington, D. C., October 1, 1891.

SIR: I have the honor to acknowledge the receipt of your esteemed favor of the 25th ultimo, inclosing a dispatch from the American minister at Brussels, relative to his efforts to obtain a modification of the regulations of the Government of Belgium which prohibit the introduction of American fresh beef.

I would very respectfully request that our minister to Belgium be again directed to urgently insist upon the repeal by the Government of that country of that provision of its laws which requires carcasses of dressed beef imported from America to be accompanied by the lung adherent thereto.

This regulation practically prohibits all exportation of dressed beef from the United States to Belgium, as our shipments of beeves are made in quarters, the lung being removed at time of slaughter, and it is, therefore, not practicable to ship them adherent to the carcasses. The inspection laws of this country provide for both an ante-mortem and a post-mortem examination of all animals killed for exportation, and an official certification by officers of this Government as to the healthfulness of the animal at time of slaughter. The continuance by Belgium of this law is, therefore, not only an unjust discrimination against our dressed-beef products, but is a reflection on the character of our inspection.

Trusting that such reasons will be given to the Government of Belgium as will induce it to modify this unwarranted provision of law maintained against the fresh meat products of this country,

I have the honor to be, sir, your most obedient servant,

J. M. Rusk,
Secretary.

The SECRETARY OF STATE.

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